

AD

(Leave blank)

Award Number: W81XWH-07-2-0033

TITLE: Longitudinal Risk and Resilience Factors Predicting
Psychiatric Disruption, Mental Health Service Utilization &
Military Retention in OIF National Guard Troops

PRINCIPAL INVESTIGATOR:
Melissa A. Polusny, Ph.D.

CONTRACTING ORGANIZATION:

University of Minnesota
Minneapolis, MN 55455

REPORT DATE:
April 2010

TYPE OF REPORT:

Annual Report

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: (Check one)

✓ Approved for public release; distribution unlimited

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE (DD-MM-YYYY) 1 April 2010		2. REPORT TYPE Annual		3. DATES COVERED (From - To) 15 Mar 2009 - 14 Mar 2010	
4. TITLE AND SUBTITLE Longitudinal Risk and Resilience Factors Predicting Psychiatric Disruption, Mental Health Service Utilization & Military Retention in OIF National Guard Troops				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER W81XWH-07-2-0033	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Melissa A. Polusny, Ph.D. Christopher R. Erbes, Ph.D. Matthew E. Kaler, Ph.D. Email: melissa.polusny@va.gov				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) University of Minnesota Minneapolis, MN 55455				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Medical Research & Materiel Command Fort Detrick, Maryland 21702-5012				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT This report describes progress towards completing a 4-wave longitudinal cohort study of pre-deployment risk and resilience factors predictive of post-deployment levels of mental health disruptions, mental health service utilization, and military retention and attrition over time. Using standard mail survey methodology, Wave 4 self-report measures have been gathered from 57% of the Wave 1 cohort with response bias appearing to be minimal. Wave 3 data have been gathered from a second cohort with a 52% response rate, again with minimal evidence for response bias. Methods, sample characteristics, and manuscript dissemination activities relevant to the approved year 3 Statement of Work are detailed.					
15. SUBJECT TERMS Resilience, PTSD, National Guard, Longitudinal Methods, Survey Methods					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 63	19a. NAME OF RESPONSIBLE PERSON USAMRMC
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER (include area code)

Table of Contents

	<u>Page</u>
1. Introduction	2
2. Progress Report	2
2.1 Overview of the Project	2
2.2 Final Wave 3 Summary	3
2.3 Collection of Wave 4 Data: 1/34 BCT Cohort	4
2.4 Summary of 2/147 AHB Cohort Wave 2	5
2.5 Summary of 2/147 AHB Cohort Wave 3	6
2.6 Preliminary Findings	7
3. Key Research Accomplishments	11
4. Reportable Outcomes	11
4.1 Peer Reviewed Publications	11
4.2 Manuscripts Submitted for Publication	12
4.3 Manuscripts in Preparation	12
4.4 Presentations for Findings at Scientific Meetings	13
4.5 Invited Presentations/Workshops	13
4.6 Grant Proposals Submitted/Pending	13
5. Conclusion	14
6. References	14
7. Appendices	16

1. INTRODUCTION

Modern military operations have increasingly relied on National Guard and Reserve (NGR) troop deployments in peacekeeping and combat missions. As this reliance persists, there have been considerable challenges in recruiting and maintaining sufficient numbers of trained military personnel, especially within the National Guard (NG). The goal of this project is to identify psychosocial factors that predict post-deployment levels of mental health (MH) disruption, MH service utilization, and military retention and attrition over time. By learning about what predicts psychiatric problems and what hampers the use of psychiatric services, we can develop new ways to increase soldiers' resilience and recovery from deployment-related distress, and thus, increase military retention.

2. PROGRESS REPORT

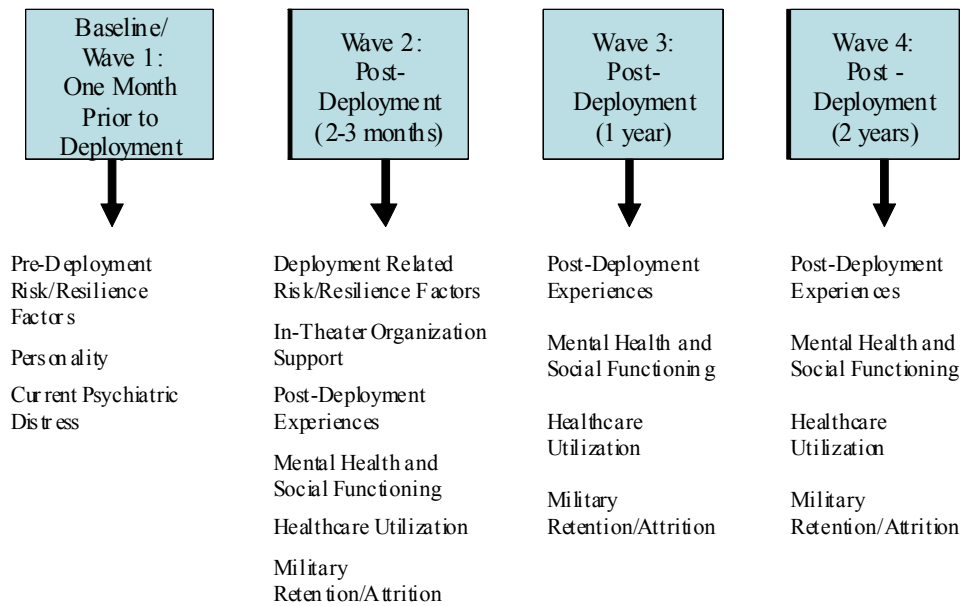
This is the third annual report for project W81XWH-07-2-0033, covering the period of 15 MAR 2009 through 14 MAR 2010. We have successfully completed all tasks outlined in our approved Statement of Work for Year 3 of the project and are progressing steadily without any notable problems. Wave 3 data from the 1/34 BCT were merged with our full longitudinal database and preliminary statistical analyses on relations between the first three waves of risk and resilience factors has begun. Findings from the results of these analyses have been shared with NG commanders as well as other DoD leadership and manuscript dissemination activities are in process. Additionally, VA MH services utilization data from VA administrative databases has been merged with survey reports (**Task 10**). Wave 2 data for the 2/147 AHB cohort and corresponding MH services utilization data from VA databases has been merged with the study database. Statistical analyses on relations between risk and resilience factors at Waves 1 and 2 have begun (**Task 11**). We completed both final phase data collection (Wave 4) for the 1/34 BCT cohort, achieving a 57% response rate (**Task 12**) and Wave 3 data collection of the 2/147 AHB cohort (**Task 13**) with a response rate of 52%. Additionally, preliminary analyses of the 2/147 AHB cohort Wave 3 data show a response rate of 49%. The report that follows provides a complete summary of our research accomplishments to date as relevant to Year 3 of our approved Statement of Work.

2.1. Overview of the Project

The overall goal of the project is to conduct a 4-wave longitudinal cohort study (see Figure 1 below for illustration of the study design and summary of constructs to be measured at each wave) to identify psychosocial factors that predict post-deployment levels of MH disruptions, MH service utilization, and military retention and attrition. Participants from two pre-deployment cohorts of National Guard soldiers (1/34 BCT deployed to Iraq between MAR 2006 and JUL/AUG 2007; 2/147 AHB deployed to Iraq between JUL 2007 and JUL 2008) are included in this study. Much of our work in the third year of the project (15 MAR 2009 through 14 MAR 2010) has focused on completing Wave 3 and Wave 4 data collection, scanning and verifying data and merging with prior wave's data, conducting preliminary longitudinal analyses, and continuing dissemination activities.

Figure 1 : Study Design and Constructs Measured at Each Wave

Prospective, longitudinal, cohort study of 522 OIF deployed National Guard soldiers



2.2. Final Wave 3 Summary: 1/34 BCT Cohort

2.2.1. Wave 3 Data Collection. For the 1/34 BCT cohort, Wave 3 data was collected from 343 participants (66% response rate). As illustrated in Table 1, survey methods were successful in maximizing our response rate.

Table 1. Response Rate for 1/34 BCT Cohort after each Wave 3 Mailing Point

Response Rates	N	%	Cumulative %
Following 1 st Survey	131	25%	25%
Following Postcard	76	15%	40%
Following 2 nd Survey	48	9%	49%
Following Fed-Ex Mailing	83	16%	65%
Following New Year's Mailing	5	1%	66%
Total	343		66%

2.2.2. Analyses of Response Bias. To test for response bias, we compared responders and non-responders to the Wave 3 survey on a number of Wave 1 (pre-deployment) variables (See Table 2 below). There were no significant differences between responders and non-responders on gender, ethnicity (white vs. non-white/multiracial), pre-deployment psychiatric symptoms (PCL total score or BDI-II total score), stressors experienced prior to deployment or perceived unit social support prior to deployment. There were minimal differences between responders and non-responders on rank (enlisted vs. officer/warrant officer), marital status, and age. Non-responders were more likely to be enlisted $\chi^2(2) = 9.03$ ($p < .05$), not married $\chi^2(1) = 20.20$ ($p < .01$), and younger than responders $t(520) = 4.66$ ($p < .01$). These results were consistent with our findings on response bias in Wave 2.

Table 2. Wave 3 Demographics of the 1/34 BCT Total Sample, Respondents, and Non-Respondents

	Total Sample (n = 522)	Respondents (n = 343)	Non-Respondents (n = 179)
Age (years)	29.1 (8.6)	30.3 (8.7)	26.7 (8.0)
Gender (% male)	88.5%	88.6%	88.3%
Marital Status (% Married)	45.4%	52.5%	31.8%
Ethnicity (% Caucasian)	92.7%	93.6%	91.1%
Rank (% enlisted)	90.2%	87.5%	95.5%
Prior Stressors	5.6 (3.2)	5.6 (3.2)	5.6 (3.3)
PTSD Symptoms (PCL)	26.2 (10.0)	25.6 (9.6)	27.3 (10.7)
Depressive Symptoms (BDI-II)	6.0 (6.8)	5.8 (6.7)	6.4 (7.0)
Unit Social Support	40.6 (9.9)	40.3 (9.9)	41.3 (9.8)

Note: PCL = PTSD Checklist; BDI-II = Beck Depression Inventory-II

As in Wave 2, these findings were not surprising. Anecdotally, younger participants appear to be more mobile and likely to list their parents' addresses when providing contact information. In this scenario, mailed surveys, while sent to the address provided, may not have reached the intended participant in a timely manner. However, the differences described above are minor overall and suggest consistently minimal response bias over time.

2.3. Collection of Wave 4 Data: 1/34 BCT Cohort

2.3.1. Wave 4 Response Rate. To date, 296 participants from the initial 1/34 BCT cohort have returned Wave 4 surveys (response rate 57% of the original 522 Wave 1 participants – 61% of the 489 participants who remain in the study as of the beginning of data collection for Wave 4). Table 3 shows that our use of routine survey methods achieve a good response rate; however, as with Wave 3 data collection, a final New Years card had little impact on additional response.

Table 3. Response Rate for 1/34 BCT Cohort after each Wave 3 Mailing Point

Response Rates	N	%	Cumulative %
Following 1 st Survey	122	23%	23%
Following Postcard	72	14%	37%
Following 2 nd Survey	53	10%	47%
Following Fed-Ex Mailing	47	9%	56%
Following New Year's Mailing	2	1%	57%
Total	296		57%

2.3.2. Analyses of Response Bias. To test for response bias at Wave 4, we compared Wave 4 responders and non-responders on a number of pre-deployment variables collected at Wave 1 (see Table 4 below). Similar to results at Waves 2 and 3, there were no significant differences between responders and non-responders on gender, ethnicity, psychiatric symptoms (PCL total score; BDI-II total score), life stressors experienced prior to deployment, and perceived unit social support prior to deployment. Again, non-responders at Wave 4 were slightly younger than responders $t(520)=4.77$ ($p < .01$). Single participants were less likely to return surveys than married participants $\chi^2(1) = 5.01$ ($p < .05$). Enlisted personnel were less likely to return surveys than officers and warrant officers $\chi^2(2) = 17.95$ ($p < .01$).

Table 4. Wave 4 Demographics of the 1/34 BCT Total Sample, Respondents, and Non-Respondents

	Total Sample (n = 522)	Respondents (n = 296)	Non-Respondents (n = 226)
Age (years)	29.1 (8.6)	30.6 (9.1)	27.1 (7.5)
Gender (% male)	88.5%	86.8%	90.7%
Marital Status (% Married)	45.4%	49.7%	39.8%
Ethnicity (% Caucasian)	92.7%	94.3%	90.7%
Rank (% enlisted)	90.2%	85.5%	96.5%
Prior Stressors	5.6 (3.2)	5.6 (3.2)	5.6 (3.3)
PTSD Symptoms (PCL)	26.2 (10.0)	25.6 (9.8)	26.9 (10.2)
Depressive Symptoms (BDI-II)	6.0 (6.8)	6.0 (6.9)	6.1 (6.7)
Unit Social Support	40.6 (9.9)	40.4 (9.7)	40.9 (10.2)

Note: PCL = PTSD Checklist; BDI-II = Beck Depression Inventory-II

2.4. Summary of 2/147 AHB Cohort Wave 2

2.4.1. 2/147 AHB Cohort Wave 2 Response Rate. In total, 104 participants from the 2/147 AHB cohort participated in Wave 2 (response rate = 51%). Table 5 shows the cumulative response rate for this cohort using standard survey methods.

Table 5. AHB Cohort Response Rate after each Wave 2 Mailing Point

Response Rates	N	%	Cumulative %
Following 1 st Survey	32	15%	15%
Following Postcard	26	13%	28%
Following 2 nd Survey	20	10%	38%
Following Fed-Ex Mailing	12	6%	44%
Following New Year's Mailing	14	7%	51%
Total	104		51%

2.4.2. Analyses of Response Bias. To test for response bias, we again compared responders and non-responders to the Wave 2 survey on a number of pre-deployment variables collected at Wave 1 (see Table 6 below). There were no significant differences between responders and non-responders on gender, ethnicity, pre-deployment psychiatric symptoms (PCL total score; BDI-II total score), life stressors experienced prior to deployment, and perceived unit social support prior to deployment. Non-responders at Wave 2 were younger $t(205) = 4.86$ ($p < .01$), and single respondents were less likely to return surveys than married participants $\chi^2(1) = 4.67$ ($p < .05$), as were enlisted participants versus officers and warrant officers $\chi^2(2) = 7.55$ ($p < .05$).

Table 6. Wave 2 Demographics of the 2/147 AHB Total Sample, Respondents, and Non-Respondents

	Total Sample (n = 207)	Respondents (n = 104)	Non-Respondents (n = 103)
Age (years)	32.3 (9.5)	30.6 (9.1)	27.1 (7.5)
Gender (% male)	82.5%	84.6%	80.8%
Marital Status (% Married)	55.5%	63.5%	48.8%
Ethnicity (% Caucasian)	72.5%	72.1%	72.8%
Rank (% enlisted)	76.4%	68.3%	83.2%
Prior Stressors	5.4 (3.2)	5.5 (3.0)	5.3 (3.3)
PTSD Symptoms (PCL)	25.5 (10.0)	26.0 (10.5)	24.7 (9.1)
Depressive Symptoms (BDI-II)	5.5 (6.2)	5.3 (6.3)	5.7 (6.0)
Unit Social Support	41.7 (9.5)	42.5 (9.7)	40.8 (8.9)

Note: PCL = PTSD Checklist; BDI-II = Beck Depression Inventory-II

The response bias findings at Wave 2 for the 2/147 AHB cohort are similar to the findings in Waves 3 and 4 for the original cohort. Younger participants are harder to track than older participants with established residences. Older participants are also more likely to be married and have the rank of officer or warrant officer. Therefore, it is not surprising that respondents and non-respondents significantly vary on these three variables.

2.5. Summary of 2/147 AHB Cohort Wave 3

2.5.1. 2/147 AHB Cohort Wave 3 Response Rate. In total, 103 participants from the 2/147 AHB cohort participated in Wave 3 (response rate = 49%). Table 7 shows the cumulative response rate for this cohort using standard survey methods.

Table 7. AHB Cohort Response Rate after each Wave 3 Mailing Point

Response Rates	N	%	Cumulative %
Following 1 st Survey	34	16%	16%
Following Postcard	34	16%	32%
Following 2 nd Survey	16	8%	40%
Following Fed-Ex Mailing	12	6%	46%
Following New Year's Mailing	7	3%	49%
Total	103		49%

2.5.2. Analyses of Response Bias. To test for response bias, we again compared responders and non-responders to the Wave 3 survey on a number of pre-deployment variables collected at Wave 1 (see Table 8 below). There were no significant differences between responders and non-responders on gender, ethnicity, marital status, rank, pre-deployment psychiatric symptoms (PCL total score; BDI-II total score), life stressors experienced prior to deployment, and perceived unit social support prior to deployment. Non-responders at Wave 3 were again younger $t(205) = 2.81$ ($p < .01$) than responders.

Table 8. Wave 3 Demographics of the 2/147 AHB Total Sample, Respondents, and Non-Respondents

	Total Sample (n = 207)	Respondents (n = 103)	Non-Respondents (n = 104)
Age (years)	32.3 (9.5)	34.3 (9.3)	30.6 (9.5)
Gender (% male)	82.5%	86.4%	79.4%
Marital Status (% Married)	55.5%	60.2%	51.6%
Ethnicity (% Caucasian)	72.5%	74.8%	70.6%
Rank (% enlisted)	76.4%	70.9%	78.6%
Prior Stressors	5.4 (3.2)	5.3 (3.2)	5.5 (3.2)
PTSD Symptoms (PCL)	25.5 (10.0)	25.7 (10.2)	25.0 (9.5)
Depressive Symptoms (BDI-II)	5.5 (6.2)	5.4 (6.4)	5.7 (5.9)
Unit Social Support	41.7 (9.5)	41.8 (9.3)	41.3 (9.3)

Note: PCL = PTSD Checklist; BDI-II = Beck Depression Inventory-II

The response bias findings at Wave 3 for the 2/147 AHB cohort actually reflect less significant response biases than in the original cohort and at the prior Wave 2 from the same cohort. Again, though, it appears that younger participants were again harder to track than older participants.

2.6. Preliminary Findings

In our 2009 Annual Progress Report, we summarized preliminary findings characterizing the pre-deployment cohort (e.g., gender differences in baseline measures of symptomatology and risk and resilience factors, impact of prior combat duty on baseline measures, rates and predictors of pre-deployment alcohol use) and early analyses on post-deployment mental health treatment seeking. Published peer-review articles reporting on these findings are attached.

Below, we summarize preliminary findings from Year 3 of this project, which are submitted for publication or in preparation at this time.

2.6.1. Post-deployment mental health. Early analyses of post-deployment mental health concerns among the sample have focused primarily upon new onset of symptoms (e.g., PTSD), characterization of post-deployment distress, and the co-occurrence of disorders among our sample. Several of the analyses used in these studies rely both upon survey data collected through this award and upon survey data combined with diagnostic data collected with VA funds through clinical interviews with 348 members of the 1/34 BCT. While interviews were not supported by the current award, when combined with the DoD funded survey data, these data offer invaluable information about how the current award's survey data relates to diagnostic interview data – evidence supporting the validity of the survey's measures.

Predictors of post-deployment new onset PTSD have been examined (Polusny, Erbes, Murdoch, Arbisi, Thuras, & Rath, 2010). Findings on pre-deployment predictors of new onset PTSD suggested that those who reported feeling less prepared for their mission and experienced more life stressors prior to deployment were more likely to exhibit new cases of PTSD. Controlling for these pre-deployment factors, exposure to combat and the aftermath of combat were independently associated with increased odds of new onset PTSD. Finally, more stressful life events following return was associated with greater odds of new onset PTSD, whereas greater reported social support following deployment decreased odds of new onset PTSD.

Additional findings on PTSD have arisen from analyses conducted using both the survey data and structured interview data (Erbes, Polusny, & Arbisi, 2010). Results examining PTSD symptom endorsement of soldiers among those who were exposed to combat trauma and those who were not showed that, as expected, those with PTSD endorsed a greater number of total symptoms than either those who were not exposed to trauma or those who were exposed to trauma, but were not diagnosed with PTSD. Further, results suggested that certain clusters of symptoms (i.e., general dysphoria symptoms, including difficulty sleeping, concentrating, irritability, exaggerated startle, social estrangement, and irritability) were less related to combat exposure than others (i.e., intrusive thoughts of the trauma and avoidance of trauma-related activities and cues).

Analysis of co-occurring psychiatric disorders among the 1/34 BCT cohort examined relations between mental health diagnoses from the structured clinical interviews and a variety of social adjustment and quality of life measures assessed by surveys (Kehle, Reddy, Ferrier-Auerbach, Erbes, Arbisi, & Polusny, 2010). Results suggested that most soldiers in our sample did not have mental health diagnosis; however among those with a diagnosis, mood disorders (e.g., major depressive disorder) and non-PTSD anxiety disorders (e.g., social phobia) were most common. As expected, having a diagnosis of a mental health disorder was associated with poorer quality of life and greater impairments in functioning. Additionally, PTSD (diagnosed in 7% of the sample using the Clinician Administered PTSD Scale) was found to have a particularly damaging effect upon quality of life, such that disorders co-occurring with PTSD were not found to add to its effect incrementally.

Analyses of the 1/34 BCT cohort survey and interview data showed that 13% of the sample met criteria for a current alcohol use disorder (i.e., alcohol abuse or alcohol dependence) (Kehle, Ferrier-Auerbach, Meis, Arbisi, Polusny, & Erbes, 2010). Of these, 38% constituted “new onset” cases; that is, they had no previous history of alcohol use disorder prior to their deployment, but developed a disorder after their return. Findings also suggested that overall PTSD severity and low levels of positive emotionality, measured by an abbreviated scale from the MMPI-2 RF, were predictors of new onset alcohol use disorders. These predictors were found to be distinct from personality variables (i.e., high negative emotionality and disinhibition) that were associated with soldiers’ pre-deployment histories of alcohol use (Ferrier-Auerbach et al., 2009).

2.6.2. Relationship Functioning. Early analysis of post-deployment variables related to soldiers’ intimate partner relationships have also begun. Initial investigations have focused on outcomes related to PTSD, relationship adjustment, and mental health treatment seeking. One set of analyses investigating the relations between PTSD, personality, and relationship adjustment following deployment suggested that certain personality factors may predispose individuals to experiencing PTSD and then experiencing relationship distress (Meis, Erbes, Polusny, & Compton, 2010). Specifically, high levels of negative emotionality, as measured by the MMPI-2 RF, were predictive of both post-deployment PTSD and post-deployment relationship maladjustment. Findings further indicated that PTSD partly accounts for the relationship between negative emotionality (measured at pre-deployment) and relationship maladjustment at post-deployment. This suggests that negative emotionality may create a pre-disposing vulnerability to PTSD which then can lead to post-deployment relationship distress.

A second set of findings suggests the severity of an individual’s PTSD symptoms positively relates to their odds of seeking any mental health care (Meis, Barry, Kehle, Erbes, & Polusny, 2010). Further, this association was strengthened among soldiers who reported better adjustment in their relationships; that is, those with more severe symptoms of PTSD were more likely to seek care when they were in more satisfying intimate relationships. An additional interaction analysis that approached significance showed that the use of family oriented mental health care (e.g., couple therapy) was related positively to relationship distress levels only at average and low levels of PTSD symptoms. This relationship was not observed among soldiers with severe PTSD symptoms. Thus, supportive and well-adjusted relationships might aid soldiers in seeking care for mental health concerns, whereas severe PTSD might stand in the way of couples seeking family mental health care when it is most needed.

2.6.3. Measurement Issues. Analyses of several frequently-used self-report assessments used for research and clinical purposes were also carried out using the unique data collected from the 1/34 BCT cohort. We have addressed the diagnostic efficiency of the Posttraumatic Stress Disorder Checklist or PCL (Weathers et al., 1993) and cutoff scores commonly used to estimate the prevalence of PTSD (Arbisi, Kaler, Kehle, Erbes, Polusny, & Thuras, 2010). By comparing the PCL scores at various cutoff scores with PTSD diagnoses determined using the Clinician Administered Posttraumatic Stress Disorder Scale (CAPS; Weathers, 2004) in clinical interviews, the PCL’s validity was evaluated. Findings suggested that using a more rigorous cutoff point on the PCL produced the best overall rate of classifying individuals in a way that

concurred with their PTSD diagnosis. Furthermore, findings raised concerns about using the PCL alone to estimate PTSD prevalence for this population as it produced large false positive error rates at even the most rigorous cutoffs.

Additional research has been conducted on the use of the MMPI-2 Restructured Form (MMPI-2 RF) among the 1/34 BCT sample. These efforts represent some of the first toward seeking evidence for the validity of the MMPI-2 RF among non-treatment seeking OIF veterans. Contrasts between scale scores on the MMPI-2 RF suggested that the measure was helpful in differentiating between soldiers who screened positive for PTSD and those who did not (Arbisi, Polusny, Erbes, Thuras, & Reddy, 2009).

Continued efforts have been put toward the development of the Response to Stressful Experiences Scale (RSES; Johnson, Polusny, Erbes, King, King, Litz, Schnurr, Friedman, Pietrzak, & Southwick, 2009), a measure of psychological resilience. The 1/34 BCT and 2/147 AHB samples were both used to evaluate the structure, reliability, and validity of the measure. Findings suggested that the RSES constitutes a brief and reliable measure of a range of cognitive, behavioral, and emotional processes that individuals characteristically employ after stressful events. The measure was found to relate as predicted to a variety of variables (and was found to be unrelated to variables that were theoretically distinct from it).

As with efforts toward better assessment of resilience-related constructs demonstrated in the development of the RSES (Johnson et al., 2009), attention has also focused on the construct of hardiness. Hardiness, a personality trait, has been shown to predict positive responses to challenges among military personnel and civilians. We have conducted analyses to examine whether hardiness is a construct distinct from other, higher-order personality constructs of positive and negative emotionality (as measured by the MMPI-2) (Erbes, Arbisi, Erickson, Kehle, Ferrier-Auerbach, & Polusny, 2009). Results suggested that the best fitting model found hardiness to be a correlated but distinct dimension of personality, with substantial relationships with both positive and negative emotionality. Hardiness did contribute to the prediction of PTSD symptoms after controlling for PEM and NEM, accounting for 1% of additional variance.

An additional measure related to resilience factors was included in one of the surveys for the 1/34 BCT cohort. The posttraumatic growth inventory (PTGI; Tedeschi & Calhoun, 1996) measures individuals' reports of having observed personal growth following a traumatic event. A 10-item short form of the PTGI was recently developed (Cann et al., 2009) in a population comprised of undergraduate students, and thus requires evidence for its validity among a different sample. Analyses from the 1/34 BCT cohort suggested that the short form maintains a structure consistent with that proposed by its authors and that it was reliable and related as hypothesized with outcomes of interest (e.g., intrusive thinking about a traumatic event and satisfaction with life) (Kaler, Erbes, Tedeschi, Arbisi, & Polusny, 2010).

2.6.4. Military Health Research Forum. Findings related to pre-deployment, in-theater, and post-deployment risk factors for PTSD were presented by Dr. Polusny at the Military Health Research forum held in Kansas City, Missouri (Polusny, Erbes, Arbisi, Thuras, Reddy, Murdoch, Erickson, & Campbell, 2009). In the overall model, it was found that factors examined in the

study accounted for approximately half of the variability in PTSD at 3 months post-return. As predicted there was a nearly 5-fold increase in rates of screening positive for PTSD symptoms between pre-deployment and post-deployment. Among pre-deployment factors, gender (i.e., being female), baseline PTSD symptoms, and the personality variable negative emotionality were significant predictors of elevated PTSD symptoms at 3-months. Combat exposure, exposure to the aftermath of battle, and the perceived threat upon one's life were all significant in-theater predictors at 3-months post-return. Last, post-deployment social support (measured concurrently with PTSD) was found to be a significant and substantial protective factor, associated with less risk for PTSD after return from battle.

3. KEY RESEARCH ACCOMPLISHMENTS

- Characterized levels of post-deployment psychiatric distress, co-occurrence of disorders among National Guard troops
- Identified longitudinal predictors of new onset PTSD including pre-deployment and post-deployment factors
- Identified predictors of new onset versus pre-existing substance use disorders
- Characterized the relations between personality, PTSD, and relationship distress following return from combat
- Characterized the effects of relationship satisfaction and PTSD symptom severity on soldiers mental health treatment seeking behaviors
- Identified appropriate use and cutoffs for the PCL – a frequently used self-report measure of PTSD – among NG troops
- Characterized the utility of the MMPI-2-RF in assessing non-treatment seeking veterans for PTSD
- Contributed to the validation of the National Center for PTSD Reactions to Stressful Events Scale (RSES) – a new measure of psychological resilience for use in military samples
- Characterized the validity of hardiness in contrast with other measures of resilience factors
- Contributed to the validation of a new short form of a frequently used measure of growth following hardship (the PTGI-SF)

4. REPORTABLE OUTCOMES

The following is a comprehensive list of published, submitted, and in progress manuscripts, abstracts, and presentations that have resulted from the current project in Year 3:

4.1. Peer Reviewed Publications

- Carter-Visscher, R., Polusny, M. A., Murdoch, M., Thuras, P., Erbes, C. & Kehle, S. (2010). Gender differences in predeployment stressors and mental health among U.S. National Guard troops poised for Operation Iraqi Freedom (OIF) deployment. *Journal of Traumatic Stress, 23*, 78-85.
- Ferrier-Auerbach, A.G., Kehle, S., Erbes, C. R., Arbisi, P. A., Thuras, P., & Polusny, M. A. (2009). Pre-deployment predictors of alcohol use in National Guard soldiers. *Addictive Behaviors, 34*, 625-631.

- Kehle, S. M., Polusny, M. A., Murdoch, M., Erbes, C., Arbisi, P. A., Thuras, P., & Meis, L. (2010). Early mental health treatment seeking among U.S. National Guard soldiers deployed to Iraq. *Journal of Traumatic Stress, 23*, 33-40.
- Polusny, M. A., Erbes, C. R., Arbisi, P. A., Thuras, P., Kehle, S., Rath, M., Courage, C., Reddy, M. K. & Duffy, C. (2009). Impact of prior OEF/OIF combat duty on mental health in a pre-deployment cohort of National Guard soldiers. *Military Medicine, 174*, 353-357.
- Reddy, M. K., Polusny, M. A., Murdoch, M. M. (2009). On counterbalancing of symptom-reporting in trauma surveys. *Psychological Reports, 105*, 1154-1158.

4.2. Manuscript Submitted for Publication (under review or revision)

- Arbisi, P.A., Kaler, M., Kehle, S., Erbes, C.R., Erbes, C. R., Polusny, M.A., & Thuras, P. (2010). Diagnostic efficiency of the PTSD Checklist in a non-clinical sample of combat exposed National Guard troops. Manuscript submitted for publication.
- Arbisi, P. A., Polusny, M.A., Erbes, C. R., Thuras, P., & Reddy, M. (2009). The impact of posttraumatic stress disorder and mild traumatic brain injury on the Minnesota Multiphasic Personality Inventory 2 Restructured Form in National Guard soldiers recently returned from Iraq. Manuscript submitted for publication.
- Johnson, D. C., Polusny, M. A., Erbes, C. R., King, D., King, L., Litz, B. T., Schnurr, P. P., Friedman, M., Pietrzak, R. H., & Southwick, S. M. (2009). Resilience and response to stress: Development and initial validation of the Response to Stressful Experiences Scale (RSES). Manuscript submitted for publication.
- Kaler, M. E., Erbes, C. R., Tedeschi, R. G., Arbisi, P. A., & Polusny, M. A. (2010). Factor structure and concurrent validity of the Posttraumatic Growth Inventory – Short Form among veterans from the Iraq War. Manuscript submitted for publication.
- Kehle, S. M., Reddy, M. K., Ferrier-Auerbach, A., Erbes, C. R., Arbisi, P. A., & Polusny, M. A. (2010). Psychiatric diagnoses, comorbidity, and functioning in National Guard troops deployed to Iraq. Manuscript submitted for publication.
- Meis, L.A., Barry, R., Kehle, S. M., Erbes, C. R., & Polusny, M. A. (2010). Relationship adjustment, PTSD symptoms, and treatment utilization among coupled National Guard soldiers deployed to Iraq. Manuscript submitted for publication.
- Meis, L. A., Erbes, C., Polusny, M. A., & Compton, J. S. (2010). Intimate relationships among OIF veterans: The mediating and moderating roles of negative emotionality, PTSD, and alcohol problems. Manuscript submitted for publication.
- Polusny, M. A., Erbes, C. R., Murdoch, M., Arbisi, P. A., Thuras, P., & Rath, M. (2010). Prospective risk factors for new onset PTSD in National Guard soldiers deployed to Iraq. Manuscript submitted for publication.

4.3. Manuscripts in Preparation

- Erbes, C. R., Polusny, M. A., & Arbisi, P. A. (2010). Posttraumatic stress disorder and symptoms in National Guard soldiers following combat deployment. Manuscript in preparation.
- Meis, L. A., Erbes, C. R., Kaler, M. E., Polusny, M. A., & Arbisi, P. A. (2010). The longitudinal latent structure of PTSD among two cohorts of OIF soldiers: Before, during, and following deployment to Iraq. Manuscript in preparation.

Kehle, S. M., Ferrier-Auerbach, A. G., Meis, L. A., Arbisi, P. A., Polusny, M. A., & Erbes, C. R. (2010). Onset of alcohol use disorders following deployment to Operation Iraqi Freedom. Manuscript in preparation.

4.4. Presentations of Findings at Scientific Meetings

- Arbisi, P.A., Erbes, C., Polusny, M.A., Thuras, P., Reddy, M. (2009). The classification accuracy of the MMPI-2 RF in identifying psychiatric illness in National Guard soldiers. Paper presented to the 44th Annual MMPI-2, MMPI-2 RF, and MMPI-A Workshops and Symposia, Minneapolis, MN.
- Polusny, M. A., Erbes, C., Arbisi, P. A., Thuras, P., Reddy, M., Murdoch, M., Erickson, D., & Campbell, R. (August, 2009). Prospective risk and resilience factors associated with PTSD symptoms in National Guard soldiers deployed to Iraq. Paper presented at the Military Health Research Forum, Kansas City, MO.
- Erbes, C. R., Arbisi, P. A., Erickson, D., Kehle, S., Ferrier-Auerbach, A., & Polusny, M. A. (November, 2009). Hardiness: Beyond positive and negative emotionality? Paper presented at the International Society for Traumatic Stress Studies (ISTSS) Annual Meeting, Atlanta, GA.
- Meis, L. A., Erbes, C., & Polusny, M. A., & Compton, J. S. (2009, November). Couple functioning and PTSD symptom clusters in National Guard veterans of the Iraq War. Paper presented at the International Society for Traumatic Stress Studies (ISTSS) Annual Meeting, Atlanta, GA.
- Meis, L. A., Barry, R. A., Kehle, S. M., Erbes, C., & Polusny, M. A., (2010, August). Relationship distress, PTSD, and treatment seeking among post-deployment OIF soldiers. In S. L. Sayers (Chair), Family members and combat veterans: Innovations in engagement and care. Symposium accepted for the annual convention of the American Psychological Association, San Diego, California.

4.5. Invited Presentations/Workshops

- Erbes, C.R. & Polusny, M.A. (2009, December). Soldier mental health and family functioning among National Guard soldiers. Invited presentation at the Second Annual Trauma Spectrum Disorders Conference sponsored by National Institutes of Health, Department of Defense, and Department of Veterans Affairs, Bethesda, MD.
- Polusny, M.A. (2010, March). Mental health risk and resilience in military personnel deployed to wars in Iraq and Afghanistan. Invited presentation at the Fifth annual Midwestern Conference on Professional Psychology, Owatonna, MN.

4.6. Grant Proposals Submitted/Pending

- Polusny, M.A. (PI) & Erickson, D. Developing a Prediction Model for Early Identification of Warriors on Resilient versus Hazardous Psychological Health Trajectories. Concept award proposal submitted to the Department of Defense, PT090734. Recommended for Funding as Alternate.

Arbisi, P.A. (PI), Polusny, M. A., Sponheim, S., DeYoung, C. Pre-deployment identification of genetic and personality dimensions associated with the development of trauma related psychological health problems. Concept award proposal submitted to Department of Defense, unfunded.

Polusny, M.A. (PI), Erbes, C.R., Arbisi, P.A., & DeGarmo, D. Readiness and Resilience in National Guard Soldiers (RINGS-2): Risk and Protective Factors, Multiple Deployment, and Psychological Health Trajectories. Investigator Initiated Award proposal submitted to Department of Defense Psychological Health and Traumatic Brain Injury Research Program (W81XWH-09-PH/TBIRP-IIRA), Log No. PT090415. Pending.

5. CONCLUSION

This report describes progress in the third year of a 4-wave longitudinal cohort study of pre-deployment risk and resilience factors predictive of post-deployment levels of mental health disruptions, mental health service utilization, and military retention and attrition over time. In the third year, we have accomplished the important work of completing Waves 3 and 4 data collection from the original cohort, conducting preliminary analyses of the longitudinal data, continuing dissemination activities, and continuing Waves 2 and 3 of data collection from a second cohort to increase our overall N to guard against the attrition inherent in longitudinal studies.

For the period of 15 MAR 2009 through 14 MAR 2010, we have met all tasks outlined in the approved Statement of Work. The project is progressing on schedule with no notable problems. Project tasks for Year 3 were completed in a timely manner. Wave 3 self-report measures were successfully collected from 66% of the Wave 1 cohort; 57% of participants have completed Wave 4 self-report measures. While our response rate has decreased from Wave 3 to Wave 4, this is consistent with the natural attrition that occurs in longitudinal studies. We have taken steps to increase our sample size for future analyses by adding the 2/147 AHB cohort to our sample. We have successfully collected Wave3 data from 103 participants from this cohort. Preliminary analyses have been conducted, and the results have been outlined in this report. Dissemination of these results is ongoing, with 5 peer-reviewed publications completed in Year 3, and 8 manuscripts submitted for publication and currently in review or revision. Our research team is fully prepared and ready to accomplish the tasks outlined for the final year of the project.

6. REFERENCES

- Arbisi, P. A., Kaler, M., Kehle, S., Erbes, C.R., Erbes, C. R., Polusny, M.A., & Thuras, P. (2010). Diagnostic efficiency of the PTSD Checklist in a non-clinical sample of combat exposed National Guard troops. Manuscript submitted for publication.
- Cann, A., Calhoun, L. G., Tedeschi, R. G., Taku, K., Vishnevsky, T., Triplett, K. N. et al. (2009). A short form of the Posttraumatic Growth Inventory. *Anxiety, Stress, & Coping*, 1-11.
- Erbes, C. R., Arbisi, P. A., Erickson, D., Kehle, S., Ferrier-Auerbach, A., & Polusny, M. A. (November, 2009). Hardiness: Beyond positive and negative emotionality? Paper presented at the International Society for Traumatic Stress Studies (ISTSS) Annual Meeting, Atlanta, GA.

- Erbes, C. R., Polusny, M. A., & Arbisi, P. A. (2010). Posttraumatic stress disorder and symptoms in National Guard soldiers following combat deployment. Manuscript in preparation.
- Ferrier-Auerbach, A.G., Kehle, S., Erbes, C. R., Arbisi, P. A., Thuras, P., & Polusny, M. A., (2009). Pre-deployment predictors of alcohol use in National Guard soldiers. *Addictive Behaviors*, 34, 625-631.
- Johnson, D. C., Polusny, M. A., Erbes, C. R., King, D., King, L., Litz, B. T., Schnurr, P. P., Friedman, M., Pietrzak, R. H., & Southwick, S. M. (2009). Resilience and response to stress: Development and initial validation of the Response to Stressful Experiences Scale (RSES). Manuscript submitted for publication.
- Kaler, M. E., Erbes, C. R., Tedeschi, R. G., Arbisi, P. A., & Polusny, M. A. (2010). Factor structure and concurrent validity of the Posttraumatic Growth Inventory – Short Form among veterans from the Iraq War. Manuscript submitted for publication.
- Kehle, S. M. Ferrier-Auerbach, A. G., Meis, L. A., Arbisi, P. A., Polusny, M. A., & Erbes, C. R. (2010). Onset of alcohol use disorders following deployment to Operation Iraqi Freedom. Manuscript in preparation.
- Kehle, S. M., Reddy, M. K., Ferrier-Auerbach, A., Erbes, C. R., Arbisi, P. A., & Polusny, M. A. (2010). Psychiatric diagnoses, comorbidity, and functioning in National Guard troops deployed to Iraq. Manuscript submitted for publication.
- Meis, L.A., Barry, R., Kehle, S. M., Erbes, C. R., & Polusny, M. A. (2010). Relationship adjustment, PTSD symptoms, and treatment utilization among coupled National Guard soldiers deployed to Iraq. Manuscript submitted for publication.
- Meis, L. A., Erbes, C., Polusny, M. A., & Compton, J. S. (2010). Intimate relationships among OIF veterans: The mediating and moderating roles of negative emotionality, PTSD, and alcohol problems. Manuscript submitted for publication.
- Polusny, M. A., Erbes, C., Arbisi, P. A., Thuras, P., Reddy, M., Murdoch, M., Erickson, D., & Campbell, R. (August, 2009). Prospective risk and resilience factors associated with PTSD symptoms in National Guard soldiers deployed to Iraq. Paper presented at the Military Health Research Forum, Kansas City, MO.
- Polusny, M. A., Erbes, C. R., Murdoch, M., Arbisi, P. A., Thuras, P., & Rath, M. (2010). Prospective risk factors for new onset PTSD in National Guard soldiers deployed to Iraq. Manuscript submitted for publication.
- Tedeschi, R. G., & Calhoun, L. G. (1996). The posttraumatic growth inventory: Measuring the positive direction of trauma. *Journal of Traumatic Stress*, 9, 455-471.
- Weathers, F. W. (2004). *Clinician-Administered PTSD Scale: Technical manual*. Los Angeles, CA: Western Psychological Services.
- Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993). *The PTSD Checklist (PCL): reliability, validity and diagnostic utility*. Paper presented at the Annual Meeting of the International Society for Traumatic Stress Studies, San Antonio, TX.

7. APPENDICES

- A. Reportable Outcomes
- B. Curriculum Vita for Matthew Kaler, Ph.D.

Predeployment Gender Differences in Stressors and Mental Health Among U.S. National Guard Troops Poised for Operation Iraqi Freedom Deployment

Robin Carter-Visscher

Minneapolis Veterans Affairs Medical Center (VAMC), Minneapolis, MN and Sioux Falls VAMC, Sioux Falls, SD

Melissa A. Polusny

Minneapolis Veterans Affairs Medical Center (VAMC), Center for Chronic Disease Outcomes Research, Minneapolis VAMC, and Department of Psychiatry, University of Minnesota Medical School, Minneapolis, MN

Maureen Murdoch

Minneapolis Veterans Affairs Medical Center (VAMC), Center for Chronic Disease Outcomes Research, Minneapolis VAMC, and Department of Medicine, University of Minnesota Medical School, Minneapolis, MN

Paul Thuras

Minneapolis Veterans Affairs Medical Center (VAMC), and Department of Psychiatry, University of Minnesota Medical School, Minneapolis, MN

Christopher R. Erbes

Minneapolis Veterans Affairs Medical Center (VAMC), and Department of Psychiatry, University of Minnesota Medical School, Minneapolis, MN

Shannon M. Kehle

Minneapolis Veterans Affairs Medical Center (VAMC), Center for Chronic Disease Outcomes Research, Minneapolis VAMC, and Department of Medicine, University of Minnesota Medical School, Minneapolis, MN

Increased exposure of women soldiers to combat in current conflicts heightens interest in the question of whether risk and resilience factors differ for female and male military personnel prior to deployment. The authors examined this question in a panel of 522 National Guard soldiers (462 men and 60 women) poised for deployment to Iraq. Soldiers completed a battery of self-report measures, including the PTSD Checklist, Beck Depression Inventory-II, and scales from the Deployment Risk and Resilience Inventory. Modest differences were observed between women and men on predeployment risk factors and some risk-related correlations with PTSD and depression measures; however, gender did not moderate the associations between hypothesized risk/resilience factors and baseline mental health. Implications for interventions and future research are discussed.

This research was supported by grants from the Minnesota Medical Foundation (Grant #3662-9227-06) and Department of Defense Congressionally Directed Medical Research Program (W81XWH-07-2-003). The authors wish to thank MAJ Cora Courage and COL Michael Rath for their assistance with subject recruitment for this project. We would also like to express our appreciation to other members of the research team who contributed to this work: Kenna Bolton-Holz, Robyn Campbell, Molly Charlesworth, Olivia Darrah, Courtney Duffy, Ashley Gulden, Nicole Hofman, Katie Koenig, Kari Leiting, Shannon Martin, Lynsey Miron, Amy Moran, Madhavi Reddy, Kailey Roberts, and Alicia Sandberg. Portions of this study were presented at that annual meeting of the Department of Veterans Affairs Health Services Research & Development service.

Correspondence concerning this article should be addressed to: Melissa A. Polusny, Minneapolis VA Medical Center (116B), One Veterans Drive, Minneapolis, MN 55417. E-mail: melissa.polusny@va.gov.

© 2010 International Society for Traumatic Stress Studies. Published online in Wiley InterScience (www.interscience.wiley.com) DOI: 10.1002/jts.20481

Although women have taken up arms and participated in every major U.S. conflict since the Revolutionary War (Murdoch et al., 2006), female soldiers' ever-increasing military representation and the progressively blurred distinction between combat and noncombat roles has led to historically unprecedented combat exposures and casualties among women deployed to the current conflicts in Iraq (Operation Iraqi Freedom; OIF) and Afghanistan (Operation Enduring Freedom; OEF). Despite the increasing number of women in the military, little is known about gender differences in military personnel before deploying to a combat zone. The goal of the current study is to address this gap in the literature.

Evidence concerning risk factors for posttraumatic stress disorder (PTSD; Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003) indicates the importance of not only war zone factors (e.g., severity of combat exposure), but also predeployment (e.g., childhood environment, prior stressors, prior psychopathology) and postdeployment (e.g., subsequent life stressors and social support) factors (King, King, Fairbank, Keane, & Adams, 1998; King, King, Foy, & Gudanowski, 1996; Vogt & Tanner, 2007). Within this overall framework, male and female soldiers are likely to bring distinctly gendered historical risk factors that may influence their predeployment mental health functioning. For example, although military personnel generally report high rates of trauma exposure prior to deployment, female soldiers are more likely to have a history of sexual trauma, and male soldiers are more likely to have a history of nonsexual traumas (Stretch, Knudson, & Durand, 1998). This distinction is important because sexual violence is associated with the highest conditional risk of PTSD (Breslau, Chilcoat, Kessler, & Davis, 1999). In addition, female soldiers have reported poorer childhood family environments characterized by greater childhood abuse compared to male soldiers (Rosen & Martin, 1996), and this risk factor has been found to be a robust predictor of military-related PTSD (King, King, Foy, Keane, & Fairbank, 1999).

Women do not receive formal combat training because they are prohibited from direct combat military occupational specialties (MOS; e.g., infantry). As a result, women may feel less prepared for deployment to a combat zone than men. Similarly, female military personnel are a minority group situated in a male-dominated work environment and past research indicates that perceived lack of deployment social support is a stronger risk factor for depression in women following deployment than men (Vogt, Pless, King, & King, 2005). It is relevant to examine whether unit social support is already a concern while soldiers are poised for deployment as this may uniquely impact women's baseline functioning. Finally, concerns about family and life disruptions back home have been found to have a stronger relationship with women's postdeployment mental health compared to men's (Malone et al., 1996; Ryan-Wenger, 1992; Vogt et al., 2005) and may begin to impact soldiers during mobilization.

An important limitation of previous studies has been their reliance upon retrospective designs. With the exception of Vogt,

Proctor, King, King, and Vasterling (2008) who examined predeployment differences in women's and men's stressor exposure, we are aware of no studies that have examined gender differences in a range of risk and resilience factors prior to troops' deployment. Thus, it is important to examine whether there are baseline gender differences in historical, environmental, and psychological risk factors as troops prepare for deployment.

In the present study, our goals were to examine gender differences in an array of psychosocial risk and resilience factors assessed prior to deployment, identify gender differences in predeployment mental health indicators, and examine whether gender moderates the associations between risk/resilience factors and baseline mental health functioning. We measured PTSD and depression symptoms at predeployment and anticipated that women would report more baseline mental health symptoms than men. We expected the relationships between prior stressor exposure and both PTSD and depression symptoms would be stronger for women than for men. Likewise, we predicted the relationship between environmental risk/resilience factors (e.g., perceptions of military preparedness, perceptions of unit social support, and concerns about life and family disruptions) and mental health symptoms would be stronger for women compared to men.

METHOD

Participants and Procedure

Data were collected from a convenience sample of 522 soldiers from a United States Army National Guard Brigade Combat Team one month prior to troops' deployment to OIF. Based on aggregate administrative data provided by Brigade Combat Team commanders, the current sample represented approximately 20% of the Brigade Combat Team. At the time of data collection in March 2006, soldiers had completed 5 months of intensive mobilization training at Camp Shelby, Mississippi, and were poised for a one-year deployment (Polusny et al., 2009). Over approximately $2\frac{1}{2}$ weeks, soldiers were invited through unit announcements and flyers to attend a group briefing session about the study. Multiple group briefings were held by investigators throughout each day of the recruitment period. The size of each group briefing session varied, but generally involved attendance of about 6 to 20 soldiers. After providing written informed consent, soldiers voluntarily completed a battery of self-report measures in group classrooms under standardized conditions with an investigator present to answer questions. The procedures lasted about 60 minutes. Procedures were approved by the relevant institutional review boards and the National Guard command.

The 522 participants ranged in age from 18 to 57 years ($M = 29.1$, $SD = 8.6$) and included 462 men and 60 women. The sample represented a range of MOSs categorized as combat arms (48%), combat support (16%), and combat service support (36%). Years of education ranged from 9 to 23 years ($M = 14.2$,

$SD = 2.0$). Aggregate administrative data obtained from the command suggested that participants in the current study were broadly representative of all soldiers deployed to Iraq with the brigade, although women were slightly overrepresented in the sample (12% vs. 9%). Ninety percent of the sample (89% of men and 97% of women) versus 89% of the brigade was enlisted personnel. Sixty percent of the sample (58% of men and 78% of women) was between the ages of 18 and 29 years compared to 65% of the brigade. About 45% of the sample (48% of men versus 27% of women) was married compared to 39% of the overall brigade. Finally, 92% of the sample (92% of men and 90% of women) was Caucasian compared to 94% of the brigade.

Measures

The PTSD Checklist-Civilian Version (PCL-C; Weathers, Huska, & Keane, 1991) was used to measure posttraumatic stress symptomatology. This measure consists of 17 items corresponding to the symptom criteria for PTSD. Respondents are asked to rate each item on a scale from 1 = *not at all* to 5 = *extremely* indicating the degree to which they were bothered by the designated symptom within the previous month. The PCL has demonstrated test-retest reliability (Weathers, Litz, Herman, Huska, & Keane, 1993) and high overall convergent validity with other measures of PTSD (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). Internal consistency for this sample was .92.

The Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996) was used to measure the severity of depressive symptoms. This 21-item measure is widely used in both clinical and nonclinical populations. Respondents are asked to rate on a 4-point scale (0–3) how often they have experienced each item in the past 2 weeks. Total scores range from 0 to 63. The BDI-II has demonstrated adequate reliability and validity (Beck et al., 1996). Internal consistency for this sample was .91.

Selected scales from the Deployment Risk and Resilience Inventory (DRRI; King, King, Vogt, Knight, & Samper, 2006) were used to measure five risk/resilience factors. The DRRI is a collection of 14 scales designed to assess psychosocial risk and resilience factors for military personnel deployed to combat zones. It has demonstrated adequate reliability and validity in both Gulf War (King et al., 2006) and OIF (Vogt, Samper, King, King, & Martin, 2008) military veteran samples. We initially selected the two original predeployment scales, Prior Stressors and Childhood Family Environment. Prior Stressors (number of 17 items endorsed; $\alpha = .73$) assessed exposure to different stressors and potentially traumatic events before deployment (e.g., physical assault, sexual abuse, domestic violence, previous combat duty). In addition to the total score, all 17 items from this scale were examined individually to compare endorsement rates across genders. Childhood Family Environment (sum of 15 items rated on a Likert scale from 1 = *almost none of the time* to 5 = *almost all of the time*; $\alpha = .91$) assessed the extent of cohesion, accord and closeness

among members in the individual's family of origin with higher scores representing positive family environments.

Three additional DRRI scales (Preparedness, Unit Social Support, Concerns about Life, and Family Disruptions) were selected based upon our assumption that these factors are relevant before soldiers deploy to a combat zone. Preparedness (sum of 14 items rated on a Likert scale from 1 = *strongly disagree* to 5 = *strongly agree*; $\alpha = .81$) assessed the extent to which an individual believed, at the time of data collection, that she or he was prepared for the upcoming deployment (e.g., "I have all the supplies and equipment needed to get my job done."). Unit Social Support (sum of 12 items rated on a Likert scale from 1 = *strongly disagree* to 5 = *strongly agree*; $\alpha = .91$) assessed the individual's current beliefs about their relationship with other military personnel (e.g., "The commanding officer(s) in my unit are supportive of my efforts."). Concerns about Life and Family Disruptions (sum of 14 items rated on a Likert scale from 4 = *a great deal* to 1 = *not at all*, with 0 = *not applicable*; $\alpha = .81$) assessed individuals' concerns about how their upcoming deployment might affect important life domains (e.g., "I am concerned about missing important events at home such as birthdays, weddings, funerals, graduations, etc."). Verb tense for these scales was modified to reflect present tense, rather than past tense in the original versions. Preparedness and Unit Social Support explored soldiers' current perceptions at the time of measure administration, whereas Concerns about Life and Family Disruptions asked soldiers to anticipate how deployment would affect their life and family.

Data Analysis

We initially examined potential gender differences in prior life stressors, risk/resilience factors, and mental health symptoms using chi-square or Student's t tests, as appropriate. We used the Fisher r to Z transformation to test for differences (one-tailed) in correlation coefficients between men and women. Dichotomous prior stressor items were used to determine the percentage of men and women that had experienced each stressor type. Effect sizes were reported using Cohen's d following conventions for interpretation (Cohen, 1988, 1992) such that a small effect = .20, medium = .50, and large = .80. We used hierarchical multiple regression to examine the independent associations between gender, hypothesized risk and resilience factors, and both mental health variables. To evaluate the potential moderating effect of gender on any association between our hypothesized predictors and mental health, we centered predictor variables and generated interaction terms between gender and each predictor. Because interactions can sometimes mask main effects, we tested for interactions even when gender was not independently associated with the outcome of interest in the main effects model. We determined the family-wise error rate based on tests of the main effect and interaction terms from the seven multiple regression analyses for each mental health outcome. We applied the Hochberg step-up procedure (Hochberg,

1988) to adjust for multiple tests performed for the family of comparisons listed in Tables 2 through 5, with adjustments conducted separately for each table. In the Hochberg procedure, the p -values for a set of tests are arranged from largest to smallest. The largest value is evaluated at alpha (i.e., .05). If the null hypothesis is not rejected, the next largest value is evaluated at $\alpha/2$ (i.e., .05/2 = .025) and so on until the null hypothesis is rejected (the p -value is less than the adjusted α). At this point, all further p -values lead to rejection of the null hypothesis for the associated tests.

RESULTS

Table 1 shows no significant differences in PTSD symptom severity between women and men, but women endorsed significantly more depression symptoms. Similarly, women (0%) and men (4%) did not differ in terms of positive screens for PTSD based on criteria according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*; American Psychiatric Association, 1994, i.e., endorsement of at least one intrusion symptom, three avoidance symptoms, and two hyperarousal symptoms at the moderate level) plus a total PCL score of at least 50 (Hoge et al., 2004), $\chi^2(1, N = 516) = 2.60, p = .107$, but more women than men (13% vs. 5%), $\chi^2(1, N = 514) = 6.95, p = .008$, screened positive for depression based on a BDI-II score of 20 or greater indicating probable depression (Beck et al., 1996).

Women and men did not differ in terms of reported life stressor types, averaging 6.1 and 5.6 respectively, $F(1, 519) = 1.13, ns$. The percentage of women and men endorsing each prior stressor scale item is listed in Table 2. A greater proportion of women than men endorsed having a parent with a substance use disorder, $\chi^2(1, N = 520) = 12.20, p < .001$; history of emotional mistreatment, $\chi^2(1, N = 520) = 10.61, p < .001$; and both childhood and adult sexual assault, $\chi^2(1, N = 510) = 18.59, p < .001$; $\chi^2(1, N = 522) = 109.85, p < .001$, respectively. A greater proportion of men than women endorsed childhood physical assault experiences, $\chi^2(1, N = 522) = 8.50, p < .004$.

On average, women and men scored similarly in ratings of childhood family environments (women, $M = 52.3, SD = 11.0$; men, $M = 53.6, SD = 10.1$), $F(1, 518) = .75, p = .39$, and

Table 2. Frequencies of Prior Life Stressor by Gender

Variable	Men % ($n = 462$)	Women % ($n = 60$)
Parent with substance use disorder	25	47*
Witnessed physical fighting between parents	31	38
Emotional mistreatment	38	60*
Childhood physical assault	55	35*
Childhood sexual assault	6	22*
Physical punishment during childhood	53	42
Adult physical assault	33	30
Adult sexual assault	2	37*
Mental/physical illness of someone close	43	57
Divorce or left by significant other	28	32
Lost job	36	23
Death of someone close	72	77
Witnessed assault or death	32	23
Robbed or home broken into	27	23
Natural disaster	33	37
Exposure to toxic substance	14	13
Combat or war zone exposure	24	10

* $p \leq .05$ (Hochberg adjustment for multiple comparisons).

concerns about life and family disruptions that might take place while they were deployed (women, $M = 28.1, SD = 6.4$; men, $M = 28.9, SD = 7.6$), $F(1, 518) = .62, ns$. However, women scored significantly lower than men on preparedness for deployment (women, $M = 32.5, SD = 7.2$; men, $M = 34.7, SD = 7.4$), $F(1, 519) = 4.79, p < .05$, and perceived unit social support (women, $M = 37.9, SD = 9.7$; men, $M = 41.0, SD = 9.9$), $F(1, 519) = 5.07, p < .05$. Effect sizes were small for preparedness ($d = .19$) and unit support ($d = .20$).

Table 3 presents the correlations among the risk/resilience factors and baseline mental health symptoms, with coefficients for men presented above the diagonal and coefficients for women below. The only significant gender differences in this set of correlations indicated that the measure of concerns about life and family disruptions that may take place back home during deployment was more strongly associated with PTSD ($z = 1.65$), $p < .05$, and depression ($z = 1.95$), $p < .05$, symptoms for women than for men.

Tables 4 and 5 illustrate the results of hierarchical multiple regression analyses conducted to test the potential moderating effect of gender on the associations between risk/resilience factors and self-reported symptoms of PTSD and depression. These show no main effects for gender on PTSD symptoms and no significant interactions involving gender for either PTSD or depression symptoms. Female gender did remain independently associated with depression symptoms even after controlling for other hypothesized risk and resilience factors. Moreover, greater prior stressor

Table 1. Descriptive Statistics and Group Contrasts for Pre-deployment PCL-C and BDI-II Scores

Variable	Men ($n = 460$)		Women ($n = 60$)		$t(df = 1)$	ES
	M	SD	M	SD		
PCL – C	26.0	10.2	27.4	8.4	<1	0.09
BDI – II	5.6	6.7	9.5	7.2	–4.25*	0.38

Note. ES = Effect sizes using Cohen's d . PCL-C = PTSD Checklist – Civilian Version; BDI-II = Beck Depression Inventory-II.

* $p < .05$.

Table 3. Correlations Among Variables by Gender

Variable	PCL-C Total	BDI-II Total	Prior stressors	Childhood environment	Preparedness	Unit support	Family concerns
PCL-C total		.76*	.21*	-.28*	-.24*	-.28*	.26*
BDI-II total	.71*		.16*	-.29*	-.29*	-.40*	.22*
Prior stressors	.13	.07		-.32*	-.07	-.17*	.20*
Childhood environment	-.35	-.17	-.36		.14*	.32*	-.16*
Preparedness	-.12	-.30	-.14	.08		.51*	-.23*
Unit support	-.28	-.49*	-.12	.18	.47*		-.27*
Family concerns	.46*	.46*	.24	-.25	-.28	-.05	

Note. Correlations for male soldiers are presented above the diagonal, and correlations for female soldiers are presented below the diagonal. PCL-C = PTSD Checklist – Civilian Version; BDI-II = Beck Depression Inventory-II; Childhood environment = childhood family environment; Family concerns = concern about life/family disruptions.

* $p < .05$ (Hochberg adjustment for multiple comparisons).

exposure, poorer childhood family environment, perceptions of poorer preparedness, lower levels of unit social support, and greater concerns about how deployment may disrupt life and family were independently associated with PTSD and depression symptoms prior to deployment. History of childhood physical assault was independently associated with depression symptoms only.

DISCUSSION

Our findings indicate that this cohort of male and female National Guard troops had low rates of mental health symptoms after completing 5 months of intensive training and anticipating deployment to Iraq in one month. Although women and men were similar in terms of the number of different lifetime stressors experienced prior to deployment and their ratings of childhood family environments (e.g., cohesion, accord and closeness among family members), women were more likely to report having a parent with a substance use disorder, a history of emotional mistreatment, and a history of sexual assault. Men more frequently reported childhood physical assault. Despite prior exposure to life stressors, none of the women and few men met strict screening criteria for PTSD.

Although no gender differences were observed for posttraumatic stress symptoms, as expected, women reported greater depression symptoms prior to deployment than men. In addition, women screened positive for moderate or greater depression at 13%, more than twice the 5% rate for men. Although not directly comparable, these rates are similar to national prevalence rates of depression observed in the general population, which indicate approximately 9% of women and 5% of men carry a current diagnosis of major depressive disorder (Kessler, Chiu, Demler, Merikangas, & Walters, 2005). Additionally, women reported feeling less prepared and perceived less unit social support compared to men. Overall, the magnitude of gender differences observed were modest, suggesting that male and female troops are relatively similar to each other with respect to psychosocial risk and resilience factors

reported one month prior to deployment. This outcome is consistent with Vogt, Proctor, et al.'s (2008) postdeployment gender comparisons and extends these findings by providing comparable information about male and female troops' functioning prior to deployment.

Contrary to our hypotheses, gender did not moderate the relationship between risk and resilience factors and baseline mental health. Based on our overall sample size of approximately 500, but taking into account the increased standard error in measurement for the smaller subsample of women ($n = 60$), we estimate 80% power to find a significant interaction with partial correlation effect of about .10 using an alpha of .05. This corresponds to an increase in R^2 of 1% over the variance explained by the main effects. By convention, this is considered a small effect and, thus, it seems unlikely that type II errors account for our failure to reject the null hypothesis. The available statistical power supports the relative absence of baseline differences between the men and women in our sample.

Although gender did not emerge as a moderator of the relation between risk and resilience factors and panel members' baseline mental health, gender-specific bivariate correlations highlighted one factor that men and women differed on. Concerns about life and family functioning during deployment were more strongly related to PTSD and depression symptoms for women compared to men. If replicated, these findings may have implications for the development of prevention strategies such as implementing family interventions to help military personnel manage worries before deployment.

The current study has several limitations. Data were cross-sectional and based on self-report. The panel of National Guard soldiers examined was a convenience sample of mostly male, Caucasian soldiers. Although demographic characteristics of our panel were broadly comparable to the population from which they were sampled, we do not know whether those who participated and those who did not were different on other variables that may have

Table 4. Summary of Multiple Regression Analyses for Prior Stressor Exposures Predicting Mental Health Symptoms

Prior stressor exposure	PTSD symptoms		Depression symptoms	
	β	Adjusted R^2	β	Adjusted R^2
Number of prior stressor exposures				
Step 1		.04		.05
Gender	.03		.18**	
Prior stressor	.20**		.15**	
Step 2		.04		.05
Gender	.04		.18**	
Number of prior stressors	.22**		.16**	
Gender \times number of prior stressors	-.05		-.04	
Childhood family environment				
Step 1		.08		.10
Gender	.03		.17**	
Childhood family environment	-.29**		-.27**	
Step 2		.08		.10
Gender	.03		.18**	
Childhood family environment	-.29**		-.29**	
Gender \times childhood family environment	.01		.05	
Childhood physical assault				
Step 1		.00		.04
Gender	.05		.20**	
Childhood physical assault	.05		.11**	
Step 2		-.001		.05
Gender	.06		.27**	
Childhood physical assault	.06		.14**	
Gender \times childhood physical assault	-.02		-.11	
Childhood sexual assault				
Step 1		.00		.03
Gender	.03		.18**	
Childhood sexual assault	.05		.01	
Step 2		-.001		.03
Gender	.03		.20**	
Childhood sexual assault	.06		.04	
Gender \times childhood sexual assault	.00		-.05	

** $p < .001$.

influenced findings. Therefore, findings should be generalized with caution, and future studies should consider oversampling women to increase power for gender comparisons. Our sample also was constrained to National Guard troops, which extends the literature, but also potentially limits the ability to generalize findings to other military branches.

This study extends existing literature by identifying several associations that were evident at the time our panel was poised for OIF deployment. Having experienced more lifetime stressors, feeling less prepared for deployment, perceiving a lack of unit support, and

feeling concerned about how deployment might negatively impact one's life and family were all associated with poorer predeployment mental health. Conversely, quality of childhood family environment was negatively associated with mental health symptom indicators prior to deployment. Compared with previous research, this study provides a more extensive analysis of gender differences in risk and resilience factors among soldiers poised for deployment to a combat zone. Current data provide a foundation for examining gender differences in mental health that may emerge following deployment.

Table 5. Summary of Multiple Regression Analyses for Environmental Risk/Resilience Factors Predicting Mental Health Symptoms

Risk/resilience factor	PTSD symptoms		Depression symptoms	
	β	Adjusted R^2	β	Adjusted R^2
Deployment preparedness				
Step 1		.05		.11
Gender	.02		.16**	
Preparedness	-.23**		-.28**	
Step 2		.05		.11
Gender	.03		.16**	
Preparedness	-.24**		-.28**	
Gender \times preparedness	.05		-.01	
Unit social support				
Step 1		.08		.19
Gender	.02		.15**	
Unit social support	-.28**		-.40**	
Step 2		.07		.19
Gender	.02		.13**	
Unit social support	-.28**		-.39**	
Gender \times unit social support	.01		-.05	
Concerns about life and family disruptions				
Step 1		.07		.09
Gender	.05		.19**	
Life/family disruptions	.27**		.24**	
Step 2		.07		.10
Gender	.06		.20**	
Life/family disruptions	.26**		.21**	
Gender \times life/family disruptions	.06		.10	

** $p < .001$.

REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory* (2nd ed.). San Antonio, TX: The Psychological Corporation.
- Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD Checklist (PCL). *Behaviour Research and Therapy*, 34, 669–673.
- Breslau, N., Chilcoat, H. D., Kessler, R. C., & Davis, G. C. (1999). Previous exposure to trauma and PTSD effects of subsequent Trauma: Results from the Detroit Area Survey of Trauma. *American Journal of Psychiatry*, 156, 902–907.
- Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, 68, 748–766.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155–159.
- Hochberg, Y. (1988). A sharper Bonferroni procedure for multiple tests of significance. *Biometrika*, 75, 800–802.
- Hoge, C. W., Castro, C. A., Messer, S. C., McGurk, D., Cotting, D. I., & Koffman, R. L. (2004). Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *New England Journal of Medicine*, 351, 13–22.
- Kessler, R. C., Chiu, W. T., Demler, O., Merikangas, K. R., Walters, E. E. (2005). Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of General Psychiatry*, 62, 617–627.
- King, L. A., King, D. W., Fairbank, J. A., Keane, T. M., & Adams, G. A. (1998). Resilience-recovery factors in post-traumatic stress disorder among female and male Vietnam veterans: Hardiness, postwar social support, and additional stressful life events. *Journal of Personality and Social Psychology*, 74, 420–434.
- King, D. W., King, L. A., Foy, D. W., & Gudanowski, D. M. (1996). Prewar factors in combat-related posttraumatic stress disorder: Structural equation modeling with a national sample of female and male Vietnam veterans. *Journal of Consulting and Clinical Psychology*, 64, 520–531.
- King, D. W., King, L. A., Foy, D. W., Keane, T. M., & Fairbank, J. A. (1999). Posttraumatic stress disorder in a national sample of female and male Vietnam veterans: Risk factors, war-zone stressors, and resilience-recovery variables. *Journal of Abnormal Psychology*, 108, 164–170.
- King, L. A., King, D. W., Vogt, D. S., Knight, J., & Samper, R. E. (2006). *Deployment Risk and Resilience Inventory: A collection of measures for studying*

- deployment-related experiences of military personnel and veterans. *Military Psychology*, 18, 89–120.
- Malone, J. D., Page-Dobson, B., Ohl, C., DiGiovanni, C., Cunnion, S., & Roy, M. J. (1996). Possibilities for unexplained chronic illnesses among Reserve units deployed in Operation Desert Shield/Desert Storm. *Southern Medical Journal*, 89, 1147–1155.
- Murdoch, M., Bradley, A., Mather, S., Klein, R., Turner, C., & Yano, E. (2006). Women and war: What physicians should know. *Journal of General Internal Medicine*, 21, S5–S10.
- Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin*, 129, 52–73.
- Polusny, M. A., Erbes, C. R., Arbisi, P. A., Thuras, P., Kehle, S., Rath, M., et al. (2009). Impact of prior OEF/OIF combat duty on mental health in a pre-deployment cohort of National Guard soldiers. *Military Medicine*, 174, 353–357.
- Rosen, L. N., & Martin, L. (1996). Impact of childhood abuse history on psychological symptoms among male and female soldiers in the U.S. Army. *Child Abuse & Neglect*, 20, 1149–1160.
- Ryan-Wenger, N. M. (1992). Physical and psychosocial impact of activation and deactivation on Army Reserve nurses. *Military Medicine*, 157, 447–451.
- Stretch, R. H., Knudson, K. H., & Durand, D. (1998). Psychological health and trauma in male and female soldiers. *Military Medicine*, 163, 363–367.
- Vogt, D. S., Pless, A. P., King, L. A., & King, D. W. (2005). Deployment stressors, gender, and mental health outcomes among Gulf War I veterans. *Journal of Traumatic Stress*, 18, 115–127.
- Vogt, D. S., Proctor, S. P., King, D. W., King, L. A., & Vasterling, J. J. (2008). Validation of scales from the Deployment Risk and Resilience Inventory in a sample of Operation Iraqi Freedom veterans. *Assessment*, 15, 391–403.
- Vogt, D. S., Samper, R. E., King, D. W., King, L. A., & Martin, J. A. (2008). Deployment stressors and posttraumatic stress symptomatology: Comparing active duty and National Guard/Reserve personnel from Gulf War I. *Journal of Traumatic Stress*, 21, 66–74.
- Vogt, D. S., & Tanner, L. R. (2007). Risk and resilience factors for posttraumatic stress symptomatology in Gulf War I Veterans. *Journal of Traumatic Stress*, 20, 27–38.
- Weathers, F. W., Huska, J. A., & Keane, T. M. (1991). PCL-C for DSM-IV. Boston: National Center for PTSD, Behavioral Science Division.
- Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993, November). The PTSD Checklist: Reliability, validity & diagnostic utility. Paper presented at the Annual Meeting of the International Society for Traumatic Stress Studies, San Antonio, TX.



This article appeared in a journal published by Elsevier. The attached copy is furnished to the author for internal non-commercial research and education use, including for instruction at the authors institution and sharing with colleagues.

Other uses, including reproduction and distribution, or selling or licensing copies, or posting to personal, institutional or third party websites are prohibited.

In most cases authors are permitted to post their version of the article (e.g. in Word or Tex form) to their personal website or institutional repository. Authors requiring further information regarding Elsevier's archiving and manuscript policies are encouraged to visit:

<http://www.elsevier.com/copyright>



Predictors of alcohol use prior to deployment in National Guard Soldiers

Amanda G. Ferrier-Auerbach^{*}, Shannon M. Kehle, Christopher R. Erbes, Paul A. Arbisi, Paul Thuras, Melissa A. Polusny

Minneapolis VA Medical Center, One Veterans Drive, Minneapolis, MN 55417, United States

ARTICLE INFO

Keywords:
Alcohol use
Substance use
Military
PTSD
Personality

ABSTRACT

Frequent and heavy alcohol use is associated with negative mental and physical health consequences. Previous research has suggested that alcohol misuse is associated with demographic, personality, and mental health variables. This study examined the relative contribution of these factors in predicting drinking among National Guard soldiers prior to deployment to a combat zone. Members of a National Guard Brigade Combat Team ($N = 515$) completed questionnaires assessing drinking behaviors in the past year (frequency, quantity, binge, and total drinking), as well as demographic, personality, and mental health variables. As a group, demographic and personality variables significantly predicted all drinking outcomes. Negative emotionality and disconstraint were independent predictors of all drinking variables. Younger age predicted higher quantity of drinking, while being unmarried predicted greater total drinking and higher frequency of binge drinking. Once the influence of personality variables were accounted for, mental health was not associated with any drinking variable. The results of this study illustrate the role of factors associated with problematic drinking in a sample of high-risk individuals.

Published by Elsevier Ltd.

1. Introduction

Alcohol use has long been part of military culture and is, in fact, more prevalent than alcohol use in even high-risk civilian populations, such as college students (Ames & Cunradi, 2004/2005). Despite recent concerns about the frequency and volume of alcohol consumption in the military (von Zielbauer, 2007), heavy drinking, defined as five or more drinks per typical drinking occasion, continues to increase among military personnel (Bray & Hourani, 2007). Heavy alcohol use in the general population has been associated with serious and potentially fatal health and social consequences, as well as negative consequences for emotional well-being and mental health (Macdonald, Wells, Giesbrecht, & Cherpitel, 1999; Stewart, 1996; Tseng, 2001). There is no reason to expect that the impact of heavy alcohol consumption would be lessened in military populations and in fact, drinking among military personnel may result in more serious consequences given the culture of drinking in the military and the physical and emotional demands of the military (Ames & Cunradi, 2004/2005).

Heavy alcohol use may occur throughout one's military career, but alcohol use in the context of mobilizing for combat deployment has recently received attention in the literature. Hoge et al. (2004) reported that 17% of Army soldiers used alcohol more than they intended to prior to deployment to Iraq, while 13% of Army

soldiers felt they needed to cut down on their drinking prior to deployment. Individuals who are about to be deployed may drink excessively as a way to cope with the emotions associated with being deployed. This pattern of drinking prior to deployment may become more problematic and potentially impact others in the unit, particularly as it may be continued in theater as a way to cope with the stress of combat (Lande, Marin, & Ruzek, 2003). Most studies of alcohol use in the military focus on drinking behaviors among active duty military personnel, as opposed to National Guard or reserve components of the military. Members of the Reserve or National Guard may be at higher risk for heavy weekly drinking, binge drinking, and negative alcohol-related consequences than active duty members of the military, possibly because members of the Reserve or National Guard must transition between military and civilian settings and may not feel adequately prepared for deployment stresses (Jacobson et al., 2008). In an effort to better understand drinking that occurs in a military context, researchers have used factors that have been found to contribute to drinking in civilian populations. Demographic factors, such as having lower levels of education and being younger, White, male, and unmarried have all been found to be related to greater alcohol consumption (Ames & Cunradi, 2004/2005; Bray et al., 2003; Bray & Hourani, 2007; Jacobson et al., 2008; Tseng, 2001).

Other factors related to drinking behaviors in civilian populations emerge from the broad and interrelated categories of personality and mental health (e.g., Adams, Boscarino, & Galea, 2006; Krueger & Markon, 2006; Marsh & Dale, 2005). Krueger,

^{*} Corresponding author. Tel.: +1 612 629 7580; fax: +1 612 467 5265.
E-mail address: amandaferrier@hotmail.com (A.G. Ferrier-Auerbach).

McGue, and Iacono (2001) described two higher-order personality factors, labeled internalizing and externalizing, associated with different patterns of alcohol consumption. In general, individuals who tend toward internalizing spectrum disorders are characterized by high negative emotionality (neuroticism), while individuals who tend more toward the externalizing spectrum exhibit high levels of negative emotionality combined with high levels of disinhibition, or the tendency toward disinhibition (Krueger & Markon, 2006; Krueger, Markon, Patrick, Benning, & Kramer, 2007). High scores on measures of disinhibition and negative emotionality are associated with substance-related disorders (Arbisi, Polusny, Erbes, Thuras, & Kehle, 2007; Bradizza, Stasiewicz, & Paas, 2006; Krueger, 1999; Miller, Vogt, Mozley, Kaloupek, & Keane, 2006). Taken together, findings across a variety of settings and conditions have pointed to a strong relationship between substance use and personality, and it is likely that individuals with certain personality types, particularly those with high levels of negative emotionality and low levels of constraint (externalizing individuals), are more likely to engage in heavy alcohol use.

The presence of a mental health condition appears to be associated with alcohol misuse. According to the Substance Abuse and Mental Health Services Administration (2005), serious psychological distress is associated with binge (defined as five or more drinks on at least one occasion in the past 30 days) and heavy drinking. In particular, there appears to be high comorbidity between depression and alcohol use (Adams et al., 2006; Compton, Conway, Stinson, & Grant, 2006).

Heavy use of alcohol also appears to be associated with posttraumatic stress disorder (PTSD). This condition is particularly relevant to individuals in the military, who are frequently exposed to traumatic combat situations. A recent study found that 43.9% of a sample of members of the British Armed Soldiers who met criteria for PTSD also screened positive for severe alcohol problems (Rona et al., 2009). It is well known that PTSD and substance use disorders are highly comorbid. The mechanism of association between PTSD and alcohol use is not entirely understood, but recent findings point to a causal role for PTSD in the development of heavy alcohol consumption, where an individual first develops a distress syndrome such as PTSD after being exposed to a traumatic event, then turns to alcohol as a way to self-medicate the emotional suffering (Marsh & Dale, 2005; Ruzek, 2003). However, the relationship between alcohol use and PTSD may be bi-directional; heavy alcohol use may lead to emotional dysfunction as well, perhaps by increasing the likelihood that one will develop PTSD following a traumatic event or experience more severe symptoms of PTSD (e.g., Stewart, 1996). The vulnerability to PTSD that may be conferred by heavy alcohol use is likely to be particularly important for individuals who engage in heavy drinking immediately prior to deploying to a combat zone, as it may increase the likelihood that these individuals will later be diagnosed with PTSD or other mental health issues, such as other anxiety disorders (Kushner, Abrams, & Borchardt, 2000).

More recent work has suggested that personality and mental health symptoms may interact in their relationship to alcohol problems. Wakiza, Watson, and Doebbeling (2007) found PTSD to be more robustly related to underlying personality traits than to the presence of other anxiety disorders. The development of PTSD and psychiatric comorbidity after exposure to traumatic events is likely to be closely related to underlying personality traits mustered to cope with the emotional reaction to the event. For example, when individuals with diagnoses of PTSD were classified into groups based on internalizing and externalizing personality traits, individuals with externalizing PTSD were more likely to exhibit high negative emotionality and low levels of constraint. Further, the externalizing individuals were more likely than those with internalizing PTSD to have comorbid alcohol-related disorders (Miller, 2003; Miller, Kaloupek, Dillon, & Keane, 2004).

However, individuals with both internalizing and externalizing subtypes of PTSD exhibited relatively high levels of substance abuse compared with individuals who did not carry a PTSD diagnosis. These studies provide evidence of the importance of integrating information on multiple risk factors for substance use, with special attention to enduring temperamental factors that may set the stage for the development of comorbid psychiatric conditions.

Although alcohol misuse poses a problem for military personnel who are about to be deployed, no study has yet examined the relative contribution of a broad range of factors that may be involved in heavy drinking during the period of mobilization prior to combat deployment in a sample of National Guard soldiers. The goal of the current study is to examine known predisposing factors that may be involved in misuse of alcohol prior to deployment, including demographic factors, personality variables, and prior mental health as they relate to drinking behaviors. We hypothesize that higher alcohol use in the military will be associated with (a) demographic variables, including younger age, male gender, Caucasian status, lower levels of education, and unmarried status; (b) personality variables, including higher levels of negative emotionality and disinhibition; and (c) pre-deployment mental health, including higher levels of PTSD and depression. Most research on drinking in the military focuses generally on drinking among active duty components of the military rather than identifying factors specific to Army National Guard soldiers. The research that has focused on differences between active duty and Reserve or Guard units has suggested that Reserve and National Guard personnel are more likely to experience negative alcohol-related consequences than are active duty personnel (Jacobson et al., 2008). The goal of the current study was therefore to provide a closer examination of the relative contributions of known predisposing factors in a high-risk sample of Army National Guard soldiers.

2. Method

2.1. Participants and procedure

Participants in the study were taken from 522 National Guard soldiers from a brigade combat team mobilized for deployment to Iraq who consented to participate and submitted anonymous responses to a paper-and-pencil pre-deployment survey. Of those 522 soldiers, 515 provided data on alcohol use and were included in analyses. The cohort of soldiers was recruited via flyers and announcements in their unit and surveyed in small groups approximately one month prior to deployment, while they were undergoing intense training and preparation for deployment to Operation Iraqi Freedom (OIF). Participants had learned that they were to be deployed approximately 12 months prior to mobilization. The majority of the 515 participants (478 participants, or 92.8%) were White. Because other ethnocultural groups were not well-represented in this sample, ethnocultural group in the present study was coded as either White or Non-White. The sample ranged in age from 18 years to 57 years old with the majority of participants between the ages of 18–29 (309 participants, or 60.0%). The median age of the participants in the sample was 26 years. The majority of participants were male (455 participants, or 88.3%). A small number of participants had been previously deployed (123, or 23.9% of participants, 5.6% of whom had been previously deployed to OIF) and 280 participants, or 54.4%, were not currently married. The average number of years of education in this sample was 14.2 years. Our sample was considered to be representative of the larger unit from which it was drawn, in which the majority was also White (93.6%), male (90.9%), and enlisted rank (89.5%). All procedures were approved by relevant Institutional Research Boards and the relevant National Guard command.

2.2. Measures

2.2.1. Demographics questionnaire

Participants completed a brief demographics questionnaire that included information such as age, gender, racial/ethnic origin, marital status, military rank, and previous deployment.

2.2.2. Alcohol use

We assessed alcohol use using the 4-item set of questions from the National Council on Alcohol Abuse and Alcoholism Recommended Sets of Alcohol Consumption Questions (NIAAA, 2003). We were interested in examining patterns of drinking over the past year, which was expected to be an indicator of drinking in the context of an upcoming deployment. In particular, we were interested in examining different patterns of drinking (e.g., low-grade, steady drinking versus heavy episodic drinking, etc.). The following alcohol use variables were assessed through a self-report questionnaire to examine different styles of drinking: (a) frequency of drinking, measured as the number of days in the past year that alcohol was consumed ("During the last 12 months, how often did you usually have any kind of drink containing alcohol?"); (b) quantity of drinking, measured as the typical number of drinks per drinking day in the past year ("During the last 12 months, how many alcoholic drinks did you have on a typical day when you drank alcohol?"); (c) a composite measure reflecting total drinking, which was created by multiplying drinking quantity by drinking frequency to create a score reflecting total drinks consumed in the past year; and (d) frequency of binge drinking in the past year, measured as the number of days a participant binge-drank in the past year ("During the last 12 months, how often did you have 5 or more (males) or 4 or more (females) drinks containing any kind of alcohol within a two-hour period?"). In this sample, a binge was defined as consuming five or more drinks in a two-hour period for a man, or four or more drinks within a two-hour time period for a woman. A standard drink was defined as half an ounce of absolute alcohol (e.g., a 12 ounce can or glass of beer or cooler, a 5 ounce glass of wine, or a drink containing 1 shot of liquor).

2.2.3. PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993)

The PCL is a 17-item self-report measure designed to assess severity of PTSD symptoms. Participants are asked to rate on a 5-point Likert scale how much each of 17 symptoms has bothered them in the past month. Endorsement of PTSD symptoms is evaluated by summing the individual items to create a total score. This measure has been found to have good overall diagnostic efficiency, using the DSM-IV criteria for PTSD, of .83 (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). The PCL is considered to have good reliability and validity (Weathers et al., 1993) and is one of the most widely-used self-report measures of PTSD symptoms. Internal consistency, as measured by coefficient alpha, was found to be .92 in our sample.

2.2.4. Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996)

The BDI-II is one of the most widely-used self-report inventories of depression and includes 21 items that, summed, assess severity of depressive symptoms. The measure is typically used both to screen for and measure severity of depression. The psychometric properties of the BDI-II are well-established, e.g., coefficient alpha was found to be .93 in a population of outpatients who were diagnosed with various DSM-IV mental disorders (Beck et al., 1996) and .89 in a non-treatment seeking student sample (Whisman, Perez, & Ramel, 2000). In our sample, internal consistency was found to be .91.

2.2.5. MMPI-2, PSY-5 scales (Harkness, McNulty, & Ben-Porath, 1995)

Abbreviated versions of the PSY-5 scales from the MMPI-2 were used to measure personality. The PSY-5 scales correspond to five broad higher-order factors of personality: positive emotionality (PEM), or extraversion; negative emotionality (NEM) or neuroticism; constraint

(CON); aggressiveness; and psychoticism. Three of these scales designed to assess PEM, NEM, and CON (PEM is reversed so that higher scores reflect an absence of positive emotionality, as reflected in the PSY-5 scale name Introversion/Low Positive Emotionality) were used in the present study to assess personality factors that have been associated with alcohol use in previous studies (e.g., Graham, Ben-Porath, & McNulty, 1999; Miller et al., 2004). Given time constraints in the context of pre-deployment data collection, abbreviated versions of the PSY-5 scales were used, in which 16 out of the 29 items on the full scale were used to measure disinconstraint, 23 out of 33 items were used to measure negative emotionality, and 20 items out of 34 items on the full scale were used to measure introversion (a measure of PEM). Internal consistency, as measured by Cronbach's alpha, was as follows for all abbreviated versions of the subscales: .57 for Disconstraint, .82 for Negative Emotionality/Neuroticism, and .62 for Introversion/Low Positive Emotionality. The reliabilities of the reduced scales used in this sample are comparable to those found by the scale developers in non-clinical populations (e.g., alpha of .71 for Disconstraint, .84 for Negative Emotionality/Neuroticism, and .71 for Introversion/Low Positive Emotionality; Harkness et al., 1995). Given the breadth of the personality dimensions assessed and the considerably shortened scales, internal consistencies were felt to be adequate.

2.3. Analyses

The tests of the contributions of each of the demographic, personality, and mental health factors were accomplished through hierarchical multiple linear regression analyses. Variables were entered in blocks of factors, moving from most to least temporally stable. We entered age, gender, race, years of education, and marital status in the first block. We entered the personality variables disinconstraint, introversion/low positive emotionality, and negative emotionality/neuroticism in the second block. In the third and final block, we entered mental health variables, including level of PTSD and depressive symptoms. Four different regression equations were performed, with four different alcohol use variables reflecting alcohol use as the dependent variable: Frequency of drinking in the past year (number of days in the past year during which someone drank), quantity of drinking in the past year (average number of drinks consumed in one sitting), total average drinking (calculated as the product of average quantity of drinks per day by the number of drinks consumed on an average day), and number of binge drinking episodes in the past year. To reduce the possibility of Type 1 error, we report only those variables in the regressions that were significant at the $p < .01$ level. As suggested by previous research, it was expected that demographic, personality, and mental health variables would all contribute independently to soldiers' engagement in heavy drinking.

3. Results

3.1. Quantity and frequency of alcohol use prior to deployment

Rates of missing data were less than 3% for all variables. Analyses were conducted with listwise deletion to account for missing data. In the present sample, 10 soldiers (1.9%) reported that they had never consumed alcohol and were excluded from final analyses. We asked participants about their heaviest drinking episodes within the past year, as well as their average drinking behaviors. With regard to frequency of drinking in the past year, 2.7% said they had not consumed alcohol in the past year, while the mean number of drinking days in the past year was approximately 85.9. With regard to average quantity of drinking per drinking episode in the past year, the mean number of drinks was 4.7. Finally, with regard to the frequency of binge drinking, 26.8% of this sample reported that they engaged in binge drinking at least once per week.

3.2. Rates of psychological distress prior to deployment

The rates of probable PTSD in this sample were relatively low, which is consistent with a sample of individuals who must be healthy enough to prepare for an upcoming deployment. In this sample, approximately 7% of the sample met criteria for PTSD based on meeting reexperiencing, avoidance, and hyperarousal criteria on the PCL. Approximately 6% of our sample endorsed symptoms on the BDI indicative of depression.

3.3. Factors associated with alcohol use prior to deployment

Bivariate correlations are listed in Table 1. In this sample, zero-order correlations identified relationships between all drinking variables and age, marital status, the personality variables disinhibition and negative emotionality/neuroticism, and PTSD symptoms. In addition, gender exhibited a significant bivariate correlation with drinking quantity, while symptoms of depression were associated with drinking frequency and total drinking. Years of education exhibited significant bivariate correlations with drinking frequency, drinking quantity, and total drinking. The personality variable of introversion/low positive emotionality was associated with frequency of binge drinking.

Drinking variables, as expected, showed considerable skew and heteroskedasticity. Standardized skewness scores for frequency of drinking, quantity of drinking, total average drinking, and number of binge drinking episodes were calculated to be 10.20, 12.45, 26.72, and 20.26, respectively. Standardized kurtosis values for frequency of drinking, quantity of drinking, total average drinking, and number of binge drinking episodes were found to be 2.99, 8.21, 52.48, and 22.61, respectively. Although our sample size is large enough to provide a robust statistic with respect to non-normality, data was analyzed with both multiple linear regression and negative binomial regression, which does not assume normally distributed data. As we expected, results were nearly identical for the two approaches. Consequently, we present results of the more conventional multiple linear regression analyses here.

3.3.1. Frequency of drinking

We first examined frequency of drinking in the past year. Only the steps containing demographic and personality variables significantly added to the variance in number of drinking days in the past year [$F(5, 483) = 5.24, p < .001, R^2 \text{ change} = .05$; and $F(3, 480) = 14.23, p < .001, R^2 \text{ change} = .08$, respectively]. When we examined the contribution of individual variables to frequency of drinking, only the personality

Table 1
Bivariate correlations between predictor variables and alcohol use variables ($N = 474$).

Variable	Drinking frequency	Drinking quantity	Total drinking	Binge frequency
Age	-.17**	-.34**	-.22**	-.25**
Gender	-.03	-.12*	-.08	-.08
White	-.02	-.03	-.03	-.06
Years of education	-.03	-.25**	-.14**	-.17**
Marital status	-.17**	-.25**	-.22**	-.23**
MMPI-2 disinhibition	.26**	.34**	.29**	.28**
MMPI-2 negative emotionality/neuroticism	.23**	.30**	.27**	.26**
MMPI-2 introversion/low positive emotionality	-.06	-.09	-.05	-.10*
PCL total score	.16**	.16**	.19**	.19**
BDI-2 total score	.10*	.07	.10*	.09

Notes. MMPI-2 = Minnesota Multiphasic Personality Inventory-2; PCL = PTSD Checklist; BDI-2 = Beck Depression Inventory-2.

* $p < .05$. ** $p < .01$.

Table 2

Summary of hierarchical multiple linear regression analysis for variables predicting frequency of drinking in the past year ($N = 489$).

Variable	B	SE B	β
Block 1			
Age	-1.39	.53	-.14*
Gender	-17.35	11.63	-.07
White	-14.39	14.86	-.04
Years of Education	1.43	1.99	.03
Marital Status	-21.81	8.62	-.13
Block 2			
Age	-.57	.53	-.06
Gender	-5.76	11.75	-.02
White	-11.69	14.46	-.04
Years of education	2.74	1.93	.07
Marital status	-18.28	8.32	-.11
MMPI-2 disinhibition	6.59	1.57	.20*
MMPI-2 negative emotionality/neuroticism	3.80	.98	.19*
MMPI-2 Introversion/Low Positive Emotionality	-1.96	1.39	-.07
Block 3			
Age	-.64	.53	-.07
Gender	-3.01	12.08	-.01
White	-10.70	14.50	-.03
Years of education	2.97	1.94	.07
Marital status	-18.06	8.38	-.11
MMPI-2 disinhibition	6.55	1.57	.20*
MMPI-2 negative emotionality/neuroticism	3.62	1.22	.18*
MMPI-2 Introversion/Low Positive Emotionality	-1.68	1.44	-.06
PCL score	.66	.57	.08
BDI-2 score	-.88	.88	-.07

Notes. MMPI-2 = Minnesota Multiphasic Personality Inventory-2; PCL = PTSD Checklist; BDI-2 = Beck Depression Inventory-2.

$R^2 = .05^*$ for Block 1; $\Delta R^2 = .08^*$ for Block 2; $\Delta R^2 = .00$ for Block 3.

* $p < .01$.

variables of disinhibition and negative emotionality emerged as significant unique predictors of drinking frequency (see Table 2) [$F(10, 478) = 7.24, R^2 = .13$, adjusted $R^2 = .11$ for full model].

Table 3

Summary of hierarchical multiple linear regression analysis for variables predicting quantity of drinking in the past year ($N = 498$).

Variable	B	SE B	β
Block 1			
Age	-.11	.02	-.25*
Gender	-1.84	.48	-.16*
White	-1.05	.60	-.07
Years of education	-.25	.08	-.14*
Marital status	-.91	.36	-.12
Block 2			
Age	-.07	.02	-.17*
Gender	-1.25	.48	-.11*
White	-.95	.58	-.07
Years of education	-.18	.08	-.10
Marital status	-.70	.34	-.09
MMPI-2 disinhibition	.34	.06	.24*
MMPI-2 negative emotionality/neuroticism	.17	.04	.19*
MMPI-2 Introversion/Low Positive Emotionality	-.10	.06	-.08
Block 3			
Age	-.08	.02	-.18*
Gender	-1.06	.49	-.09
White	-.90	.58	-.06
Years of education	-.17	.08	-.09
Marital status	-.75	.34	-.10
MMPI-2 disinhibition	.34	.06	.23*
MMPI-2 negative emotionality/neuroticism	.20	.05	.22*
MMPI-2 Introversion/Low Positive Emotionality	-.08	.06	-.06
PCL score	.02	.02	.05
BDI-2 score	-.06	.04	-.11

Notes. MMPI-2 = Minnesota Multiphasic Personality Inventory-2; PCL = PTSD Checklist; BDI-2 = Beck Depression Inventory-2; DRRI = Deployment Risk and Resiliency Inventory.

$R^2 = .17^*$ for Block 1; $\Delta R^2 = .10^*$ for Block 2; $\Delta R^2 = .01$ for Block 3.

* $p < .01$.

Table 4

Summary of hierarchical multiple linear regression analysis for variables predicting total drinking in the past year ($N=496$).

Variable	<i>B</i>	<i>SE B</i>	β
Block 1			
Age	−13.31	4.76	−.15*
Gender	−282.82	104.89	−.12*
White	−133.59	132.32	−.04
Years of education	−23.03	17.73	−.06
Marital status	−244.29	77.11	−.16*
Block 2			
Age	−5.81	4.66	−.06
Gender	−170.15	104.84	−.07
White	−118.75	127.97	−.04
Years of education	−10.19	17.05	−.03
Marital status	−203.56	74.10	−.13*
MMPI-2 disinconstraint	65.01	13.69	.22*
MMPI-2 negative emotionality/neuroticism	36.79	8.70	.20*
MMPI-2 Introversion/Low Positive Emotionality	−15.41	12.41	−.06
Block 3			
Age	−6.74	4.69	−.07
Gender	−132.49	107.48	−.06
White	−105.39	128.00	−.03
Years of education	−7.33	17.13	−.02
Marital status	−201.98	74.43	−.13*
MMPI-2 disinconstraint	64.12	13.68	.21*
MMPI-2 negative emotionality/neuroticism	34.94	10.77	.19*
MMPI-2 Introversion/Low Positive Emotionality	−11.37	12.81	−.04
PCL score	8.86	5.05	.12
BDI-2 score	−12.36	7.81	−.11

Notes. MMPI-2 = Minnesota Multiphasic Personality Inventory-2; PCL = PTSD Checklist; BDI-2 = Beck Depression Inventory-2; DRRI = Deployment Risk and Resiliency Inventory.

$R^2 = .09^*$ for Block 1; $\Delta R^2 = .09^*$ for Block 2; $\Delta R^2 = .01$ for Block 3.

* $p < .01$.

3.3.2. Quantity of drinking

We then examined the factors related to quantity consumed on a typical drinking day within the past year. When examining groups of variables, only demographic and personality variables significantly accounted for variance in typical quantity of drinking [$F(5, 492) = 20.11$, $p < .001$, R^2 change = .17; and $F(3, 489) = 20.94$, $p < .001$, R^2 change = .10, respectively]. When we examined the independent contributions of factors to drinking quantity, we found that age and the personality factors of disinconstraint and negative emotionality were significantly related to drinking quantity (see Table 3) [$F(10, 487) = 17.90$, $R^2 = .27$, adjusted $R^2 = .25$ for full model].

3.3.3. Total drinking

For the tests of total drinking in the past year, or the combination of quantity and frequency of drinking within the past year, demographic variables and personality variables both added significant amounts of variance to the total amount of alcohol consumed in the past year [$F(5, 490) = 9.34$, $p < .001$, R^2 change = .09; and $F(3, 487) = 17.03$, $p < .001$, R^2 change = .09, respectively]. However, with regard to the contribution of individual variables, marital status, disinconstraint, and negative emotionality were all significantly related to total drinking (see Table 4).

3.3.4. Frequency of binge drinking

For the tests of frequency of binge drinking within the past year, a similar pattern of results emerged. As a group, demographic and personality variables accounted for significant amounts of variance in binge frequency [$F(5, 480) = 11.35$, $p < .001$, R^2 change = .11 and $F(3, 477) = 16.89$, $p < .001$, R^2 change = .09, respectively]. However, when independent predictors within the final model were examined, only marital status and the personality variables of disinconstraint and negative emotionality were significantly related to frequency of binge drinking in the past year (see Table 5) [$F(10, 475) = 11.72$, $R^2 = .20$, adjusted $R^2 = .10$ for full model].

4. Discussion

These results suggest that several variables contribute to different drinking behaviors in a National Guard sample prior to deploying to a combat zone. First, demographic factors, particularly age and marital status, significantly added to our understanding of all measures of drinking in the past year. Within this group of variables, being unmarried was associated with drinking more total alcohol over the course of a year and greater frequency of binge drinking. Younger age was associated with higher quantity of drinking on a typical drinking day, suggesting that in our population, younger individuals drank more heavily but did not engage more frequently in binge drinking. This is in contrast to other studies involving largely active duty military personnel that have suggested that younger military personnel are more likely to binge drink (Bray et al., 2003); in our sample of National Guard soldiers, the culture of binge drinking may have transcended age group.

Personality factors were also associated with greater amounts of drinking in the past year. Consistent with study hypotheses, individuals who were higher in disinconstraint and negative emotionality drank more frequently, drank more alcohol per occasion, had a higher quantity of total alcohol consumption, and engaged more frequently in binge drinking. This finding is not unexpected, given previous research that suggests that disinconstraint, or poorer impulse control, is associated with drinking behaviors, while individuals are also more likely to drink if they are attempting to “self-medicate” or cope with negative emotions (Miller et al., 2004; Ruzek, Polusny, & Abueg, 1998).

Measures of mental health did not, as a whole or individually, significantly predict any of the drinking variables studied in this paper once demographic and personality variables were controlled for. However, bivariate correlations suggested that symptoms of PTSD in particular had strong individual correlations with all drinking measures used in this study. Therefore, while symptoms of PTSD are

Table 5

Summary of hierarchical multiple linear regression analysis for variables predicting frequency of binge drinking in the past year ($N=486$).

Variable	<i>B</i>	<i>SE B</i>	β
Block 1			
Age	−1.19	.39	−.16*
Gender	−22.93	8.54	−.12*
White	−19.54	10.57	−.08
Years of education	−2.74	1.45	−.09
Marital status	−20.10	6.32	−.16*
Block 2			
Age	−.56	.38	−.07
Gender	−15.84	8.56	−.08
White	−16.70	10.21	−.07
Years of education	−1.78	1.39	−.06
Marital status	−16.69	6.06	−.13*
MMPI-2 disinconstraint	4.65	1.13	.18*
MMPI-2 negative emotionality/neuroticism	3.22	.71	.21*
MMPI-2 Introversion/Low Positive Emotionality	−2.27	1.01	−.10
Block 3			
Age	−.64	.39	−.09
Gender	−12.26	8.78	−.06
White	−15.60	10.21	−.06
Years of education	−1.49	1.40	−.05
Marital status	−16.74	6.08	−.13*
MMPI-2 disinconstraint	4.57	1.13	.19*
MMPI-2 negative emotionality/neuroticism	3.31	.87	.21*
MMPI-2 Introversion/Low Positive Emotionality	−1.86	1.04	−.08
PCL score	.65	.41	.10
BDI-2 score	−1.17	.64	−.13

Notes. MMPI-2 = Minnesota Multiphasic Personality Inventory-2; PCL = PTSD Checklist; BDI-2 = Beck Depression Inventory-2; DRRI = Deployment Risk and Resiliency Inventory.

$R^2 = .11^*$ for Block 1; $\Delta R^2 = .09^*$ for Block 2; $\Delta R^2 = .01$ for Block 3.

* $p < .01$.

associated with heavier drinking behaviors, once negative emotionality was controlled for, drinking behaviors were not uniquely related to mental health symptoms. Given that negative emotionality is a personality factor that predisposes individuals to react in a certain way to high levels of stress (e.g., by developing PTSD), it may be that negative emotionality represents a higher-order factor that better explains the propensity to drink more alcohol per occasion and more frequently. It is possible that the PCL may be more of a measure of general distress in this sample rather than symptoms specific to PTSD. It may also be that because our sample was a relatively healthy sample (rates of PTSD prior to deployment were low), the influence of PTSD symptoms was not detected in this sample but in a sample with a greater range of PTSD severity, the results might be quite different.

Given the health and social problems associated with heavy alcohol use, the results of the present study add to the literature in important ways. First, this study is one of the first to examine drinking behaviors in members of the National Guard who are in the process of preparing for an upcoming deployment. National Guard and Reserve populations have previously been suggested to be at higher risk for alcohol-related problems than active duty samples (Jacobson et al., 2008). In addition, we used four different measures of alcohol use to explore the different types of drinking that individuals may engage in. The results of this study have important implications for prevention and treatment of alcohol-related problems. Although certain factors, such as demographic and personality factors, are often either unchangeable or difficult to change, understanding how they may confer risk or protection (e.g., being married) for increased drinking may help identify at-risk individuals and inform treatment. Identification of at-risk individuals may be especially important, given research that suggests that despite high rates of alcohol misuse, referrals for treatment for substance abuse are surprisingly low among military personnel (Milliken, Auchterlonie, & Hoge, 2007). In our study, younger age was only associated with amount of alcohol consumed on a typical day. Individuals in the military who are younger may not be more likely to binge drink but may be more likely to consume higher amounts of alcohol than other individuals. These individuals may respond to interventions such as motivational enhancement or individualized feedback that provide information on appropriate and safe amounts to drink as well as the possibility that drinking may actually increase symptoms of PTSD (Ouimette, Brown, & Najavits, 1998).

Similarly, we found that personality variables were highly associated with drinking patterns. A greater understanding of how personality variables are associated with increased alcohol consumption may be used to prevent consequences of heavier drinking. Individuals who enter the military environment with high levels of disinhibition, negative emotionality, or both are more likely than individuals who do not have high levels of these personality traits to engage in heavier drinking behaviors. Knowledge of the relationship between certain personality factors and drinking behaviors may help clinicians match treatment to personality (Harkness & Lilienfeld, 1997) or allow clinicians or military personnel to identify individuals who are most at-risk for developing alcohol-use disorders. Individuals who are high in negative emotionality but not high in disinhibition, or sensation-seeking, may be more likely to need treatment such as group or individual therapy that is specifically tailored to learning to manage or cope with negative emotions that may be an underlying cause of drinking, while those who are high in disinhibition may need treatment, such as individualized feedback or therapy, that teaches them more appropriate ways to manage impulsive behaviors.

There were several limitations to this study. First, the information in this sample was collected approximately one month prior to deployment, and the data collected did not allow us to examine the temporal pattern of changes in alcohol use in the past year. Because of the cross-sectional nature of our data, it is possible that the drinking behaviors observed in this study occurred in response to learning

about their upcoming deployment, or they may simply reflect typical drinking behaviors of military personnel. Future studies could more specifically examine whether or not the drinking patterns noted in this study are temporary or whether alcohol use changes as a result of learning of an upcoming deployment. Additionally, our questions assessed depressive symptoms and symptoms of PTSD within the past month. Utilizing a longitudinal design in the future may help provide information about the relationship between mental health factors and changes in drinking behavior.

Second, the modest internal consistency of the abbreviated PSY-5 scale of disinhibition must be noted. However, we found significant results for all of our drinking variables using this scale, which suggests that the effect of disinhibition on drinking variables is quite robust. Third, our sample consisted almost entirely of Caucasian National Guard soldiers. Given that drinking behaviors differ somewhat across different branches of the military (Ames & Cunradi, 2004/2005), care should be taken before generalizing the results of this study to other ethnic/cultural groups or other branches of the military. Future studies could address this issue by replicating this study among other branches of the military or in areas of the country that may include a more representative sample of the American population. Additionally, future studies may want to include more detailed information about the history of one's drinking behaviors as well as one's motives for drinking.

The culture of drinking has been woven into the fabric of the military for many years, but given increasing awareness of the potentially negative effects of this alcohol use, it has become imperative that studies add to our understanding of risk factors for heavy alcohol use. Our study examines factors that had been known to increase likelihood of heavier drinking in civilian populations in a uniquely high-risk military population. In turn, we hope that this understanding of risk factors will be able to lead to increased awareness of individuals at risk and therefore reduce the negative consequences that may result from heavy alcohol use by leading to early intervention and prevention of alcohol use disorders.

Acknowledgements

This research was supported by grants to Melissa A. Polusny from the Minnesota Medical Foundation (Grant #3662-9227-06) and Department of Defense Congressionally Directed Peer Reviewed Medical Research Program (W81XWH-07-2-0033). The authors would like to thank MAJ Cora Courage and COL Michael Rath for their assistance with subject recruitment for this project. We would also like to express our appreciation to other members of the research team who contributed to this work: Kenna Bolton-Holz, Robyn Campbell, Molly Charlesworth, Olivia Darrah, Courtney Duffy, Ashley Gulden, Nicole Hofman, Katie Koenig, Kari Leiting, Shannon Martin, Lynsey Miron, Amy Moran, Madhavi Reddy, Kailey Roberts, and Alicia Sandberg.

References

- Adams, R. E., Boscarino, J. A., & Galea, S. (2006). Alcohol use, mental health status and psychological well-being 2 years after the World Trade Center attacks in New York City. *The American Journal of Drug and Alcohol Abuse*, 32, 203–224.
- Ames, G., & Cunradi, C. (2004/2005). Alcohol use and preventing alcohol-related problems among young adults in the military. *Alcohol Research and Health*, 28, 252–257.
- Arbisi, P. A., Polusny, M. A., Erbes, C. R., Thuras, P., & Kehle, S. (2007, August). Predictors of self-reported alcohol use in National Guard troops prior to Iraqi deployment. *Poster session presented at the annual meeting of the American Psychological Association, San Francisco, CA.*
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio, TX: Psychological Corporation.
- Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD Checklist. *Behaviour Research and Therapy*, 34, 669–673.
- Bradizza, C. M., Stasiewicz, P. R., & Paas, N. D. (2006). Relapse to alcohol and drug use among individuals diagnosed with co-occurring mental health and substance use disorders: A review. *Clinical Psychology Review*, 26, 162–178.

- Bray, R. M., & Hourani, L. L. (2007). Substance use trends among active duty military personnel: Findings from the United States Department of Defense Health Related Behavior Surveys, 1980–2005. *Addiction*, 102, 1092–1101.
- Bray, R. M., Hourani, L. L., Rae, K. L., Dever, J. A., Brown, J. M., Vincus, A. A., et al. (2003). 2002 Department of Defense survey of health related behaviors among military personnel Research Triangle Park, NC: Research Triangle Institute.
- Compton, W. M., Conway, K. P., Stinson, F. S., & Grant, B. F. (2006). Changes in the prevalence of major depression and comorbid substance use disorders in the United States between 1991–1992 and 2001–2002. *American Journal of Psychiatry*, 163, 2141–2147.
- Graham, J. R., Ben-Porath, Y. S., & McNulty, J. (1999). *Using the MMPI-2 in outpatient mental health settings*. Minneapolis, MN: University of Minnesota Press.
- Harkness, A. R., & Lilienfeld, S. O. (1997). Individual differences science for treatment planning: personality traits. *Psychological Assessment*, 9, 349–360.
- Harkness, A. R., McNulty, J. L., & Ben-Porath, Y. S. (1995). The Personality Psychopathology Five (PSY-5): Constructs and MMPI-2 scales. *Psychological Assessment*, 7, 104–114.
- Hoge, C. W., Castro, C. A., Messer, S. C., McGurk, D., Cotting, D. I., & Koffman, R. L. (2004). Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *The New England Journal of Medicine*, 351, 13–22.
- Jacobson, I. G., Ryan, M. A. K., Hooper, T. I., Smith, T. C., Amoroso, P. J., Boyko, E. J., et al. (2008). Alcohol use and alcohol-related problems before and after military combat deployment. *Journal of the American Medical Association*, 300, 663–675.
- Krueger, R. F. (1999). Personality traits in late adolescence predict mental disorders in early adulthood: A prospective epidemiological study. *Journal of Personality*, 67, 39–65.
- Krueger, R. F., & Markon, K. E. (2006). Understanding psychopathology: Melding behavior genetics, personality, and quantitative psychology to develop and empirically based model. *Current Directions in Psychological Science*, 15, 113–117.
- Krueger, R. F., Markon, K. E., Patrick, C. J., Benning, S. D., & Kramer, M. D. (2007). Linking antisocial behavior, substance use, and personality: An integrative quantitative model of the adult externalizing spectrum. *Journal of Abnormal Psychology*, 116, 645–666.
- Krueger, R. F., McGue, M., & Iacono, W. G. (2001). The higher-order structure of common DSM mental disorders: Internalization, externalization, and their connections to personality. *Personality and Individual Differences*, 31, 1245–1259.
- Kushner, M. G., Abrams, K., & Borchardt, C. (2000). The relationship between anxiety disorders and alcohol use disorders: A review of major perspectives and findings. *Clinical Psychology Review*, 2, 149–171.
- Lande, R. G., Marin, B. A., & Ruzek, J. I. (2003). Substance use in the deployment environment. *Iraq War Clinician Guide, Vol. XII*. (pp. 79–82).
- Macdonald, S., Wells, S., Giesbrecht, N., & Cherpitel, C. J. (1999). Demographic and substance use factors related to violent and accidental injuries: Results from an emergency room study. *Drug and Alcohol Dependence*, 55, 53–61.
- Marsh, A., & Dale, A. (2005). Risk factors for alcohol and other drug disorders: A review. *Australian Psychologist*, 40, 73–80.
- Miller, M. W. (2003). Personality and the etiology and expression of PTSD: A three-factor model perspective. *Clinical Psychology: Science and Practice*, 10, 373–393.
- Miller, M. W., Kaloupek, D. G., Dillon, A. L., & Keane, T. M. (2004). Externalizing and internalizing subtypes of combat-related PTSD: A replication and extension using the PSY-5 scales. *Journal of Abnormal Psychology*, 113, 636–645.
- Miller, M. W., Vogt, D. S., Mozley, S. L., Kaloupek, D. G., & Keane, T. M. (2006). PTSD and substance-related problems: The mediating roles of disconstraint and negative emotionality. *Journal of Abnormal Psychology*, 115, 369–379.
- Milliken, C. S., Auchterlonie, J. L., & Hoge, C. W. (2007). Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq War. *Journal of the American Medical Association*, 298, 2141–2148.
- National Institute on Alcohol Abuse and Alcoholism (2003). *Task Force on Recommended Alcohol Questions – National Council on Alcohol Abuse and Alcoholism Recommended Sets of Alcohol Consumption Questions – October 15–16, 2003* <http://www.niaaa.nih.gov/Resources/ResearchResources/TaskForce.htm>, retrieved 1/5/09.
- Ouimette, P. C., Brown, P. J., & Najavits, L. M. (1998). Course and treatment of patients with both substance use and posttraumatic stress disorders. *Addictive Behaviors*, 23, 785–795.
- Rona, R. J., Jones, J., Iversen, A., Hull, L., Greenberg, N., Fear, N. T., et al. (2009). The impact of posttraumatic stress disorder on impairment in the UK military at the time of the Iraq war. *Journal of Psychiatric Research*, 43(6), 649–655.
- Ruzek, J. I. (2003). Concurrent posttraumatic stress disorder and substance use disorder among veterans: Evidence and treatment issues. In P. Ouimette, & P. J. Brown (Eds.), *Trauma and substance abuse: Causes, consequences, and treatment of comorbid disorders* (pp. 191–207). Washington DC: American Psychological Association.
- Ruzek, J. E., Polusny, M. A., & Abueg, F. R. (1998). Assessment and treatment of concurrent posttraumatic stress disorder and substance abuse. In V. M. Follette, J. I. Ruzek, & F. R. Abueg (Eds.), *Cognitive-behavioral therapies for trauma* (pp. 226–255). New York: The Guilford Press.
- Stewart, S. H. (1996). Alcohol abuse in individuals exposed to trauma: A critical review. *Psychological Bulletin*, 120, 83–112.
- Substance Abuse and Mental Health Services Administration (2005). *Results from the 2004 National Survey on Drug Use and Health: National Findings (Office of Applied Studies, NSDUH Series H-28, DHHS Publication No. SMA 05-4062)*. Rockville, MD.
- Tseng, W. (2001). Alcohol-related problems. In W. Tsing (Ed.), *Handbook of cultural psychiatry* (pp. 351–365). San Diego: Academic Press.
- von Zielbauer, P. (2007). For U.S. Troops at War, Liquor Is Spur to Crime. *New York Times* Published Tuesday, 13 March.
- Wakiza, G., Watson, D., & Doebbeling, B. N. (2007). Abnormal personality and the mood and anxiety disorders: Implications for structural models of anxiety and depression. *Journal of Anxiety Disorders*, 21, 526–539.
- Weathers, F., Litz, B., Herman, D., Huska, J., & Keane, T. (1993, October). The PTSD Checklist (PCL): reliability, validity, and diagnostic utility. *Paper presented at the Annual Convention of the International Society for Traumatic Stress Studies, San Antonio, TX*.
- Whisman, M. A., Perez, J. E., & Ramel, W. (2000). Factor structure of the Beck Depression Inventory–Second Edition (BDI-II) in a student sample. *Journal of Clinical Psychology*, 56, 545–551.

Early Mental Health Treatment-Seeking Among U.S. National Guard Soldiers Deployed to Iraq

Shannon M. Kehle

Center for Chronic Disease Outcomes Research, Minneapolis Veteran Affairs Medical Center, and Department of Medicine, University of Minnesota Medical School, Minneapolis, MN

Melissa A. Polusny

Center for Chronic Disease Outcomes Research, Minneapolis Veteran Affairs Medical Center, and Department of Psychiatry, University of Minnesota Medical School, Minneapolis, MN

Maureen Murdoch

Center for Chronic Disease Outcomes Research, Minneapolis Veteran Affairs Medical Center, and Department of Medicine, University of Minnesota Medical School, Minneapolis, MN

Christopher R. Erbes

Minneapolis Veteran Affairs Medical Center, and Department of Psychiatry, University of Minnesota Medical School, Minneapolis, MN

Paul A. Arbisi

Minneapolis Veteran Affairs Medical Center, Department of Psychiatry, University of Minnesota Medical School, and Department of Psychology, University of Minnesota, Minneapolis, MN

Paul Thuras

Minneapolis Veteran Affairs Medical Center, and Department of Psychiatry, University of Minnesota Medical School, Minneapolis, MN

Laura A. Meis

Center for Chronic Disease Outcomes Research, Minneapolis Veteran Affairs Medical Center, and Department of Medicine, University of Minnesota Medical School, Minneapolis, MN

The authors examined rates of and factors associated with postdeployment treatment-seeking in a panel of 424 National Guard soldiers who spent 16 months in Iraq. Soldiers completed a self-report, mailed survey 3- to 6-months after returning home. Approximately one third of respondents reported postdeployment mental health treatment. Those who screened positive for mental health problems were more likely to indicate that they had received treatment compared to those who screened negative, but over one half of those who screened positive were not engaged with mental health treatment. Variables related to reported treatment receipt included positive attitudes about mental health therapies, having been injured in-theater, illness-based need, and having received mental health treatment while in-theater. Implications and future research directions are discussed.

This research was supported by grants from the Minnesota Medical Foundation (Grant #3662-9227-06) and Department of Defense Congressionally Directed Medical Research Program (W81XWH-07-2-0033). The authors thank MAJ Cora Courage, PhD and COL Michael Rath, MD, for assistance with subject recruitment. Kenna Bolton-Holz, Robyn Campbell, Molly Charlesworth, Olivia Darrah, Courtney Duffy, Ashley Gulden, Nicole Hoffman, Katie Koenig, Kari Leiting, Shannon Martin, Lynsey Miron, Amy Moran, Madhavi Reddy, Kailey Roberts, and Alicia Sandberg assisted with data collection.

The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs or Department of Defense.

Correspondence concerning this article should be addressed to: Shannon M. Kehle, Minneapolis VA Medical Center, One Veterans Drive (152/2E), Minneapolis, MN 55417. E-mail: Shannon.Kehle@va.gov.

© 2010 International Society for Traumatic Stress Studies. Published online in Wiley InterScience (www.interscience.wiley.com) DOI: 10.1002/jts.20480

All U.S. veterans of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), including those activated from the National Guard, are eligible for free Department of Veterans Affairs (VA) health care for 5 years following deployment. Early data suggest that approximately 40% of eligible OEF and OIF veterans have sought physical or mental health treatment at VA medical facilities (Veterans Health Administration, 2008). Of the first 103,788 OEF and OIF veterans seen, 25% were given mental health diagnoses and an additional 6% received diagnoses for other psychosocial problems (Seal, Bertenthal, Miner, Sen, & Marmar, 2007). Almost half of those with mental health problems were diagnosed with posttraumatic stress disorder (PTSD).

Although a substantial proportion of OEF and OIF returnees are using VA health care, many OEF and OIF troops, particularly those with mental health problems, may not be seeking needed treatment. Hoge and his colleagues (2004) reported that only 23 to 40% of OEF and OIF troops who screened positive for PTSD, depression, or generalized anxiety had received potentially needed mental health care within 3 to 4 months postdeployment. However, it is unclear whether findings from largely active duty samples extrapolate to National Guard and Reserve units, as there are several reasons to suspect that the National Guard population may have different rates of treatment seeking. National Guard troops tend to be older and may be more likely to have family and civilian work responsibilities than active component troops. This may lead to greater familial and occupational strain and unique reintegration challenges (Office of the Undersecretary of Defense, 2006). Further, because they are not embedded within their military units following deployments, National Guard personnel may have low levels of postdeployment support. Finally, National Guard troops are at increased risk for PTSD and other postdeployment mental health problems compared to active duty troops, possibly due to the environmental factors described above. Of National Guard and Reserve soldiers returning from OIF combat deployments, as many as 42% screen positive for mental health disruptions (Milliken, Auchterlonie, & Hoge, 2007). However, OEF and OIF National Guard troops' involvement with mental health treatment providers has not been examined.

Additionally, there have been no studies examining associations between facilitators or barriers to mental health treatment-seeking and actual care utilization among OEF and OIF soldiers or veterans. In the present study, we addressed these gaps by examining treatment-seeking rates in a panel of returning OIF National Guard soldiers and assessing likely barriers and facilitators. The research was guided by Andersen's behavioral model of health care utilization (Andersen, 1995; Andersen & Newman, 1973). Andersen's model posits three categories of variables that predict health service use: predisposing factors that are present prior to the illness (e.g., sociodemographic characteristics, combat experiences, other illnesses and health conditions), illness-related need (e.g., presence and severity of mental illness), and enabling charac-

teristics that are related to ability to seek treatment (e.g., insurance, proximity to mental health providers).

Trauma history characteristics such as combat exposure, combat intensity, and cumulative trauma exposure are predisposing factors that show positive associations with rates of treatment-seeking by military veterans (Fikretoglu, Brunet, Guay, & Pedlar, 2007; Maguen et al., 2007). Illness-related need in the form of PTSD and depressive symptoms has repeatedly been found to be a salient factor in seeking mental health treatment by earlier veteran cohorts (Elhai, Richardson, & Pedlar, 2007; Maguen et al., 2007). Need has also been shown to mediate the effects of age, race, marital status, combat experiences, and income on treatment-seeking (Maguen et al., 2007). Finally, enabling factors such as treatment costs and public insurance have also predicted treatment-seeking in earlier cohorts of veterans (Litz & Maguen, 2006; Maguen et al., 2007; Sayer et al., 2007). Besides these well-documented predictors, we speculated that receiving mental health treatments either predeployment or in-theater would be associated with mental health treatment-seeking after deployment because positive mental health care experiences could enhance veterans' willingness to engage in needed services.

The roles of psychosocial and attitudinal factors in relation to mental health treatment-seeking have also been relatively understudied. Yet, because such factors are modifiable (unlike demographics or trauma characteristics), they may be amenable to interventions designed to encourage treatment-seeking. The limited work that has been conducted on these topics shows that negative postdeployment environments (e.g., veterans' perception of others attitudes regarding veteran status) are associated with lower levels of treatment-seeking (Dobson, Grayson, Marshall, & O'Toole, 1998; Marshall, Jorm, Grayson, Dobson, & O'Toole, 1997). Surprisingly, despite the strong association between social support and PTSD, nonsignificant associations have been found between level of postdeployment social support and treatment-seeking in Vietnam era veterans (Sayer et al., 2007; Fikretoglu et al., 2007).

Attitudes about stigma may be especially salient when active duty personnel and veterans contemplate seeking help for mental health concerns. In one large study of returning OEF and OIF combatants, almost one third of participants thought they would be seen as weak or treated differently by their unit leadership if they sought mental health services, and troops with mental health problems endorsed more concerns about stigma (Hoge et al., 2004). Two other studies, one of peacekeeping veterans and another of Canadian active duty soldiers, also found that many participants had concerns about being stigmatized if they sought mental health treatment. However, none of these studies have directly examined the relationship between these attitudes and actual involvement with mental health treatment providers (Fikretoglu, Guay, Pedlar, & Brunet, 2008; Litz & Maguen, 2006).

Our goals were to determine the rate of reported mental health treatment-seeking in a panel of returning OIF National Guard

soldiers and to examine potential barriers to and facilitators of such treatment-seeking. Predisposing characteristics hypothesized to be associated with mental health treatment included predeployment mental health treatment use, in-theater injury, combat exposure and perceived threat, and poor health. Based on extant literature, we hypothesized that the following need characteristics would be associated with greater mental health treatment-seeking: PTSD and depressive symptomology, perceived need for treatment, and interest in treatment. Enabling characteristics hypothesized to be associated with greater mental health treatment-seeking included receipt of in-theater mental health treatment and satisfaction with this treatment, lower postdeployment stress, and both positive attitudes toward mental health treatments and fewer concerns about mental health-related stigma.

METHOD

Participants

Participants were 424 U.S. National Guard soldiers recruited for a larger longitudinal project that had been approved by relevant institutional review boards and National Guard command. Soldiers were originally contacted approximately one month prior to deployment to OIF while completing a 6-month mobilization training. Over the course of approximately $2\frac{1}{2}$ weeks, soldiers were invited through unit announcements and flyers to attend a group briefing session held by investigators. These sessions occurred throughout each day of the recruitment period and were generally attended by 6 to 20 soldiers. Ultimately, 522 of the approximately 2600 individuals in the total brigade completed the predeployment survey. Those who participated at baseline were demographically similar to the larger brigade. For example, 89% of the predeployment cohort versus 91% of the brigade were male; 92% versus 94% were Caucasian, 90% versus 89% were enlisted; 45% versus 39% were married; and 60% versus 65% were between age 18 and 29.

For the present investigation, data were collected using self-report mailed surveys administered approximately 2–3 months after the soldiers' return from OIF. Surveys and a \$50 incentive were mailed to each soldier who had been surveyed predeployment. We achieved an 81% response rate for the postdeployment wave of data collection.

Participants' average deployment length was 16.3 months ($SD = 3.0$) and the mean age was 31.9 ($SD = 8.8$). Postdeployment responders and nonresponders did not differ on gender, ethnicity, or predeployment PTSD and depressive symptomology. The responders were more likely to be officers (responders = 11%; nonresponders = 4%), $\chi^2(1, N = 522) = 4.43, p < .05$, married (responders = 49%; nonresponders = 31%), $\chi^2(1, N = 522) = 10.65, p < .001$, and older (responder $M = 29.9, SD = 8.8$; nonresponder $M = 25.6, SD = 6.9$), $t(520) = -4.46, p < .001$, than the nonresponders.

Measures

Mental health treatment-seeking. The outcome measure documented self-reported use of VA and non-VA psychotherapy and psychopharmacotherapy since return from OIF using a series of dichotomous (yes or no) items (Erbes, Westermeyer, Engdahl, & Johnsen, 2007). Five types of services were listed: (a) psychopharmacology, (b) one-to-one counseling, (c) group counseling, (d) couple or family counseling, and (e) chemical-dependency treatment. For analysis, all four types of nonpharmacological treatment were combined to reflect any psychotherapy use.

Predisposing characteristics. Combat experiences and perceived threat were assessed using two scales from the Deployment Risk and Resilience Inventory (DRRI; King, King, & Vogt, 2003). The DRRI consists of 14 subscales assessing a range of risk and resilience factors among military personnel. The DRRI scales demonstrate moderate to high internal consistency estimates, discriminant validity, and criterion-related validity through associations with indicators of mental and physical health among OIF veterans (Vogt, Proctor, King, King, & Vasterling, 2008). The Combat Experiences Scale assesses the presence or absence of a series of warfare circumstances and events. Items reflect objective events, rather than interpretations or judgments of these experiences (present sample $\alpha = .84$). The Perceived Threat Scale was designed to measure subjective fear, including emotional and cognitive appraisals of personal well-being and safety in the war zone (present sample $\alpha = .82$).

Thoughts and beliefs about seeking mental health services were assessed using the Attitudes Toward Seeking Professional Psychological Help Scale (ATSPPH; Fischer & Turner, 1970). The ATSPPH is the most widely used instrument for assessing such beliefs (Hatchett, 2006). For the present study, we employed the 10-item abbreviated version, which correlates $r = .87$ with the original scale (Fischer & Farina, 1995). The ATSPPH yields a single score with higher scores indicating more-positive attitudes. Internal consistency for the present sample was $\alpha = .82$.

Perceived barriers and stigma were assessed using 13 items designed to examine barriers to care among OEF and OIF veterans (Britt, 2000) that had been previously administered to a large sample of OEF and OIF military personnel (Hoge et al., 2004). The inventory does not assess responders' attitudes towards others who seek psychological services or whether responders' perceptions of stigma may lead them to avoid services; therefore, three additional items were included in the present investigation: "I would think less of a member of my team if s/he went to a psychiatrist or other mental health professional;" "I would think less of a member of my team if s/he and their spouse went to a marriage counselor;" and "I would avoid going to see a psychiatrist or other mental health professional because of how it would affect my relationship with my unit/team members." All responses were rated on a 5-point scale ranging from 1 = *strongly agree* to

5 = *strongly disagree*. To aid interpretation, we reversed the direction of the scale so that higher scores were indicative of greater barriers and higher stigma. The alpha for the full 16-item scale was .91.

A series of single items were used to assess overall health ("In general would you say your health is:" 0 = *excellent to very good*; 1 = *good to poor*), injury in-theater ("Were you ever wounded or injured in or around Iraq?"), and previous psychotherapy ("Before your recent deployment, did you ever receive any type of counseling for personal, emotional, alcohol, or family stress problems?").

Illness-related need characteristics. The PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993), which consists of 17 self-report items corresponding to each of the symptoms for PTSD according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (American Psychiatric Association, 1994), was used to assess symptom severity. Participants were instructed to rate PCL items in relation to stressful military experiences. The measure generally exhibits good internal consistency, convergent validity with other trauma and PTSD symptom measures, and good specificity and sensitivity (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Weathers et al., 1993). For the present sample, coefficient alpha was .94. To screen PTSD positive, participants were required to have a total score of at least 50 and to have endorsed one reexperiencing symptom, three avoidance symptoms, and two arousal symptoms at a moderate level or greater (Hoge et al., 2004).

Depressive symptoms were assessed using the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report instrument that asks respondents to rate the intensity of their depressive symptoms on a 0 to 3 scale. The BDI-II has excellent established validity and reliability (Beck et al., 1996). Coefficient alpha for the present sample was .90. For the current study, a score of 20 (moderate depression) or above was deemed a positive depression screen.

Single items were used to assess perceived mental health need ("Are you currently experiencing a personal, emotional, alcohol, or family stress problem?") and interest in receiving mental health treatment ("Are you currently interested in receiving professional help for a personal, emotional, alcohol, or family stress problem?").

Enabling characteristics. Postdeployment social support was assessed using the DRRI Postdeployment Social Support Scale (King et al., 2003). This subscale assesses emotional and instrumental support provided by others (present sample $\alpha = .85$). Stressful life experiences following deployment were assessed using the DRRI Postdeployment Stressors Scale, which includes potentially traumatic nondeployment-related events (i.e., car accidents, assaults, deaths of others) and stressors related to reintegration efforts (e.g., job loss, legal problems, divorce, and problems reestablishing roles within the community and family; present sample $\alpha = .55$).

Finally, single items were used to assess in-theater psychotherapy use ("Did you receive one-on-one counseling for combat stress from any mental health professional during your recent deployment?"), in-theater medication use ("During your most recent deployment to Iraq, how often did you use prescribed medications for your mood, nerves, mental health, or sleep?"), and satisfaction with in-theater mental health services ("How satisfied are you with emotional, stress-related, or mental health support you received in Iraq to deal with the demands of this most recent deployment?"). Responses to the medication item were coded dichotomously to reflect any use.

Data Analysis

We determined the number of individuals who reported receiving psychotherapy alone, medication alone, or both, and we determined the percentage of veterans who received each of the five categories of care from the VA, the military, or another source. We performed Pearson chi-square tests to determine whether soldiers with presumptive PTSD or depression reported treatment at higher rates than those without mental health problems. We hypothesized that there may be factors uniquely associated with receiving either psychotherapy or psychiatric medications; therefore, we examined the two outcomes separately. Due to the large number of potential associated variables, we first conducted a series of single predictor univariate logistic regressions to determine the relationship between the predictor variables and reported treatment-seeking. All continuously distributed variables were converted to z-scores prior to entry into the regression models. Significant univariate predictors were then entered into a stepwise forward conditional logistic regression. Variables reaching the significance level of $p < .05$ were initially entered in the model. Once entered, a p -value $> .10$ led to exclusion from the final model. For both the univariate and stepwise forward conditional logistic regressions, the dependent variable was a dichotomous measure of reported treatment-seeking. The fit of the final model was evaluated using the Hosmer and Lemeshow (2000) goodness-of-fit statistic, for which a good model fit is evidenced by a low chi-square statistic and a high p value (Hosmer & Lemeshow, 2000). All analyses were conducted using SPSS Version 17.

RESULTS

Rates of Mental Health Treatment-Seeking

Approximately one third (34.7%, $n = 147$) of the respondents reported receiving some type of mental health services since returning from Iraq (see Table 1). Nearly one quarter (22.9%, $n = 97$) of the respondents indicated they had received psychotherapy only, 4.5% ($n = 19$) indicated psychiatric medications only, and 7.3% ($n = 31$) indicated both psychotherapy and psychiatric medications. Compared to the soldiers who screened negative for PTSD,

Table 1. Type and Location of Postdeployment Mental Health Services Among a Panel of Iraq War Returnees ($n = 424$)

Type of mental health service	VA Medical			
	Total %	Facility %	Military %	Other %
Medication	10.8	6.6	4.2	3.1
Individual therapy	20.3	11.6	8.0	6.4
Group therapy	10.0	1.9	7.3	1.4
Couple therapy	11.6	2.4	6.4	5.0
Chemical dependency treatment	2.8	0.9	1.7	0.5

Note. Participants could have received more than one type of service and may have received the same service in multiple settings. VA = Veterans Affairs.

a higher percentage of 66 soldiers who screened positive for PTSD indicated that they were receiving psychotherapy (44% vs. 27%), $\chi^2(1, N = 409) = 7.49, p < .01$, or medications (30% vs. 8%), $\chi^2(1, N = 410) = 26.32, p < .001$. A similar pattern was shown by the 50 soldiers who screened positive for depression. Compared to those who screened negative, a higher percentage indicated that they were receiving psychotherapy (50% vs. 28%), $\chi^2(1, N = 409) = 9.84, p < .01$, or medications (36% vs. 9%), $\chi^2(1, N = 410) = 31.30, p < .001$.

Variables Associated With Postdeployment Psychotherapy

We conducted a principal component analysis of the 16 items included in our stigma scale. The rotated solution resulted in four factors that accounted for 68% of the total variance. Similar to Britt and colleagues (2008), this identified a Barriers to Care factor that reflects practical barriers such as inadequate transportation (five items; 15% of variance; $\alpha = .72$). Two stigma factors were also identified: a Self Stigma factor, which reflects the impact of care on the respondents' self-image and military career (seven items; 28% of variance; $\alpha = .92$); and an Others Stigma factor, which reflects perceptions about others who seek treatment (two items; 12% of variance; $\alpha = .78$). Finally, there was a Mental Health Treatment Doesn't Work factor (two items; 13% of variance; $\alpha = .76$) that is conceptually similar to the ATSPPH, but which more explicitly measures negative and distrustful attitudes towards mental health treatment and providers (i.e., "Mental health care doesn't work" and "I don't trust mental health professionals").

Table 2 presents the unadjusted associations between the hypothesized predictor variables and reported postdeployment psychotherapy. As hypothesized, receiving therapy prior to deployment, receiving therapy in-theater, higher levels of combat and perceived threat, being injured in Iraq, greater PTSD and depressive symptomology, poorer health, greater postdeployment stressors, and more positive attitudes regarding mental health treatment

were all associated with increased report of treatment-seeking. Endorsing a current mental health problem and expressing interest in mental health treatment were also significantly related to reported psychotherapy use.

We examined the total score on the stigma scale and each of the four factors in relation to reported psychotherapy treatment-seeking using a series of univariate logistic regressions. The potential range of scores for the overall scale is 16–80; the range within our sample was 16–66 ($M = 37.1, SD = 10.6$). The only factor significantly related to reported psychotherapy treatment-seeking was Mental Health Treatment Doesn't Work. More negative attitudes were associated with lower reports of psychotherapy use.

Due to relatively high multicollinearity between the four illness-based need variables ($r = .44-.77$), we conducted a principal component analysis of the four variables. Using varimax rotation, one underlying factor of Illness-Based Need emerged. The factor accounted for 67% of the total variance. We used that Illness-Based Need factor score in the regression analyses.

The stepwise forward conditional logistic regression was conducted using all significant univariate factors and the Need factor score (see Table 3). The final model was a good fit for the data; the Hosmer-and-Lemeshow fit statistic was $\chi^2(8, N = 424) = 8.02, p = .43$. Final variables associated with self-reported treatment-seeking included in-theater injury, positive attitudes about mental health treatment; the Need factor score; and receiving therapy in-theater, which had the strongest association.

Variables Associated With Postdeployment Psychiatric Medication Use

As shown in Table 2, injury in-theater, receiving therapy in-theater, receiving psychiatric medications in-theater, higher levels of combat, greater PTSD and depressive symptomology, poorer health, and greater postdeployment stressors were all associated with increased postdeployment psychiatric medication use. Endorsing a current mental health problem, expressing interest in mental health treatment, and poor social support were also significantly related to reported psychiatric medication use. The Mental Health Treatment Doesn't Work factor was the only stigma variable significantly associated with medication use, with more negative attitudes relating to lower levels of reported medication use. As in the psychotherapy analyses, the Need factor score was significantly related to self-reported medication treatment-seeking.

The stepwise forward conditional logistic regression was conducted using all significant univariate variables and the Need factor score (see Table 3). The Hosmer and Lemeshow fit statistic indicated that the model was a very good fit for the data, $\chi^2(8, N = 424) = 3.99, p = .86$. Final variables associated with self-reported psychiatric medication use included the Need factor score; the predisposing factors of in-theater injury and the stigma factor Mental Health Treatment Doesn't Work; and the enabling

Table 2. Univariate Predictors of Postdeployment Psychotherapy and Psychiatric Medication ($N = 424$)

Predictor variable	Psychotherapy		Medication	
	OR	95% CI	OR	95% CI
Predisposing factors				
Predeployment MH service use	1.71*	1.04–2.81	1.86	0.96–3.60
Injury in-theater	2.42**	1.49–3.91	5.20**	2.79–9.68
DRRI combat experiences	1.28*	1.04–1.57	1.62**	1.24–2.12
DRRI perceived threat	1.25*	1.01–1.55	1.12	0.88–1.63
Poor health	1.75*	1.13–2.72	2.78**	1.47–5.25
Positive attitudes about MH treatment	1.39**	1.11–1.73	1.21	0.89–1.65
MH treatment stigma (full scale)	0.94	0.76–1.15	1.00	0.74–1.35
Self Stigma (Factor 1)	0.99	0.81–1.23	1.17	0.87–1.57
Practical Barriers (Factor 2)	1.09	0.88–1.35	1.01	0.75–1.37
MH Doesn't Work (Factor 3)	0.78*	0.63–0.98	0.68*	0.49–0.93
Other Stigma (Factor 4)	0.88	0.71–1.09	1.01	0.75–1.36
Illness-Based Need factors				
PTSD symptoms (PCL)	1.54**	1.25–1.91	2.40**	1.78–3.23
Depression symptoms (BDI-II)	1.42**	1.15–1.75	2.04**	1.54–2.72
Current problem	2.81**	1.71–4.62	4.18**	2.00–8.75
Interested in help	4.48**	2.48–8.07	2.84**	1.32–6.14
Need factor score	1.72**	1.38–2.13	2.28**	1.69–3.08
Enabling factors				
Psychiatric medications in-theater	1.16	0.73–1.84	3.15**	1.71–5.78
Psychotherapy in-theater	3.29**	1.86–5.82	3.84**	1.95–7.58
Dissatisfaction with in-theater MH services	0.96	0.84–1.09	1.16	0.98–1.38
DRRI postdeployment stressors	1.37**	1.12–1.68	1.69**	1.31–2.16
DRRI postdeployment social support	1.12	0.91–1.38	1.45*	1.09–1.94

Note. MH = Mental health; DRRI = Deployment Risk and Resilience Inventory; PTSD = Posttraumatic stress disorder; PCL = PTSD Checklist; BDI-II = Beck Depression Inventory-II.

* $p < .05$. ** $p < .01$.

factor of psychiatric medication in Iraq. Having been injured in Iraq had the strongest association.

DISCUSSION

In a panel of OIF National Guard soldiers, almost one third endorsed receiving mental health care within 6 months of returning home. Reported treatment-seeking was more common among soldiers who screened positive for either PTSD or depression. Reports of receiving mental health care appear to be higher in this panel than in a sample of active duty OIF soldiers (Hoge et al, 2004). Although greater treatment-seeking may be partially due to greater need among National Guard soldiers (Milliken et al., 2007), different postdeployment environments may also play a role. Active duty component soldiers may have less time between deployments to engage in mental health services and may have greater concerns about the impact of receiving mental health care on their military career. The difference may also be due to contextual changes that

have occurred in the 5 years since the Hoge et al. study, including the extension of VA benefits, campaigns to foster and encourage access to treatment, and an accumulation of individuals who have experienced multiple deployments. Direct comparison between National Guard and active duty troops who were deployed at the same time and who have equal access to care would be required to address this scientifically.

Injury in-theater, attitudes regarding mental health treatment, illness-based need, and mental health treatment in-theater were significantly associated with both self-reported psychotherapy and medication treatment-seeking. More-positive attitudes regarding mental health treatment were associated with greater reported utilization of both psychotherapy and medication. A study of civilian primary care patients similarly found that positive attitudes toward seeking professional help were related to use of mental health treatments (Elhai, Patrick, Anderson, Simons, & Frueh, 2006). Providing education regarding efficacious treatments for PTSD and making those treatments more widely available to returning

Table 3. Stepwise Forward Conditional Logistic Regression Model of Postdeployment Psychotherapy and Psychiatric Medication Use ($N = 424$)

Variable	<i>B</i>	<i>SE B</i>	OR	95% CI
Psychotherapy				
Injured in-theater	0.68	0.29	1.98*	1.13–3.47
Positive attitudes about mental health treatment-seeking	0.34	0.13	1.40*	1.10–1.79
Need factor score	0.42	0.13	1.52**	1.18–1.96
Therapy in-theater	0.79	0.34	2.21*	1.12–4.33
Medication				
Injured in-theater	1.47	0.36	4.33**	2.13–8.79
Belief that mental health treatment doesn't work	−0.37	0.17	0.69*	0.49–0.97
Need factor score	0.62	0.17	1.86**	1.32–2.61
Medication in-theater	0.90	0.36	2.45*	1.20–4.99

Note. OR = odds ratio.

* $p < .05$. ** $p < .01$.

soldiers may improve attitudes towards mental health treatment and possibly encouraged treatment-seeking.

The finding that illness-based need was associated with reported treatment-seeking is consistent with previous findings in both veteran and civilian populations (Elhai, North, & Frueh, 2005; Maguen et al., 2007). However, 51% of soldiers who screened positive for PTSD and 40% who screened positive for depression did not report involvement in mental health treatment, suggesting the influence of factors other than illness-based need. Hoge et al. (2004) similarly reported that many soldiers with probable mental health problems were not receiving treatment, although the rate of reported treatment-seeking among those potentially in need appeared to be higher in this panel of National Guard soldiers than in the active duty sample described by Hoge and colleagues.

Another factor that was strongly related to self-reported treatment-seeking was in-theater injury. Previous studies of treatment-seeking have found that poorer physical health is related to mental health service use (Elhai et al., 2007; Maguen et al., 2007). It may be that veterans who are presenting for physical problems resulting from an injury are more likely to be screened for mental health problems and referred for mental health care. Further, within settings such as VA medical centers in which physical and mental health services are delivered at the same location, practical barriers for receiving mental health care may be lessened once the veteran is already accessing physical health services.

Finally, in-theater use of psychotherapy and psychiatric medications was associated with OIF troops' reports of initiating mental health treatment postdeployment. This is consistent with other recent studies showing that previous use of mental health services

predicts future use (e.g., Elhai et al., 2006) and is likely indicative of a propensity to seek professional help when experiencing distress. Predeployment mental health treatment, however, did not show the expected relationship with reported postdeployment treatment-seeking. This may be due to low levels of distress and associated low illness-based need prior to deployment or perhaps there is something unique to in-theater help that promotes postdeployment treatment-seeking. For example, in-theater service use may lessen practical barriers (e.g., the in-theater mental health provider may give specific information or referrals for postdeployment help) or reduce soldiers' concerns about stigma.

An unexpected finding was the lack of a relationship between stigma and self-reported mental health treatment-seeking. A previous study of OEF and OIF troops found significant concerns about stigma, and a report about PTSD among the Canadian military revealed that soldiers reported not receiving help due to fear of being ostracized (Hoge et al., 2004; Marin, 2002). However, to our knowledge, no study has directly linked fears about perceived stigma to actual health service utilization by troops or veterans. Our analyses indicate that although concerns about stigma were present, these concerns were not associated with reported treatment-seeking behavior. This finding is tempered by the fact that the measure we used to assess stigma and barriers lacks formal validation.

Limitations of the current study begin with reliance on a self-report measure of treatment-seeking. An objective alternative such as VA administrative data might provide a more accurate and detailed record of mental health service utilization, although it would suffer from the limitation of not capturing treatment that occurred outside of a VA facility. A second limitation is sampling from a single National Guard brigade that may not be representative of the National Guard population. For example, there may be variations in treatment-seeking by National Guard troops based on proximity to a VA medical facility or differences in unit leadership and community support. Further, the brigade from which we sampled had a higher proportion of Caucasian soldiers than the National Guard as a whole, and race has been differentially associated with involvement with mental health treatment (Elhai, Reeves, & Frueh, 2004). Another limitation is the reliance on single, unvalidated items for a number of the predictor variables. This approach was dictated by the need to limit time demands for participants with the aim of maximizing response rate for the follow-up survey. Replication of these findings using more comprehensive methods of assessment is warranted. Finally, the use of cross-sectional data is a limitation because we are unable to determine the temporal relationship between variables (e.g., participants may have better attitudes regarding mental health treatment because they had received treatment since returning from Iraq). Longitudinal follow-up data collection from this panel is underway.

In summary, approximately one third of the study sample reported that they had received mental health treatment in the first 3- to 6-months postdeployment. Although reported

treatment-seeking was higher among those who screened positive for mental health problems, approximately one half of those who were potentially in need were not engaged in treatment. Future research on this topic should utilize longitudinal data to clarify temporal relationships between variables. It should also examine the quality of both treatment engagement and services because these variables are likely to be more strongly related to symptom improvement than treatment initiation alone.

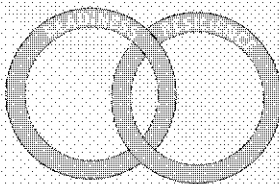
REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36, 1–10.
- Andersen, R. M., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the United States. *Milbank Memorial Fund Quarterly Journal*, 51, 95–124.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory*. (2nd ed.). San Antonio, TX: The Psychological Corporation.
- Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD Checklist (PCL). *Behavior Research and Therapy*, 34, 669–673.
- Britt, T. W. (2000). The stigma of psychological problems in a work environment: Evidence from the screening of service members returning from Bosnia. *Journal of Applied Social Psychology*, 30, 1599–1618.
- Britt, T. W., Greene-Shorridge, T. M., Brink, S., Nguyen, Q., Raht, J., Cox, A. L., et al. (2008). Perceived stigma and barriers to care for psychological treatment: Implications for reactions to stressors in different contexts. *Journal of Social and Clinical Psychology*, 27, 317–335.
- Dobson, M., Grayson, D. A., Marshall, R. P., & O'Toole, B. I. (1998). Postwar experiences and treatment-seeking behavior in a community counseling setting. *Journal of Traumatic Stress*, 11, 579–587.
- Elhai, J. D., North, T. C., & Frueh, B. C. (2005). Health service use predictors among trauma survivors: A critical review. *Psychological Services*, 2, 3–19.
- Elhai, J. D., Patrick, S. L., Anderson, S., Simons, J. S., & Frueh, B. C. (2006). Gender- and trauma-related predictors of use of mental health treatment services among primary care patients. *Psychiatric Services*, 57, 1505–1509.
- Elhai, J. D., Reeves, A. N., & Frueh, B. C. (2004). Predictors of mental health and medication service use in veterans presenting with combat-related posttraumatic stress disorder. *Psychological Services*, 1, 111–119.
- Elhai, J. D., Richardson, J. D., & Pedlar, D. (2007). Predictors of general medical and psychological treatment use among a national sample of peacekeeping veterans with health problems. *Journal of Anxiety Disorders*, 21, 580–589.
- Erbes, C., Westermeyer, J., Engdahl, B., & Johnsen, E. (2007). Post-traumatic stress disorder and service utilization in a sample of service members from Iraq and Afghanistan. *Military Medicine*, 172, 359–363.
- Fikretoglu, D., Brunet, A., Guay, S., & Pedlar, D. (2007). Mental health treatment seeking by military members with posttraumatic stress disorder: Findings on rates, characteristics, and predictors from a nationally representative Canadian military sample. *The Canadian Journal of Psychiatry*, 52, 103–110.
- Fikretoglu, D., Guay, S., Pedlar, D., & Brunet, A. (2008). Twelve month use of mental health services in a nationally representative, active military sample. *Medical Care*, 46, 217–223.
- Fischer, E. H., & Farina, A. (1995). Attitudes toward seeking professional psychological help: A shortened form and considerations for research. *Journal of College Student Development*, 36, 368–373.
- Fischer, E. H., & Turner, J. B. (1970). Orientations to seeking professional help: Development and research utility of an attitude scale. *Journal of Consulting and Clinical Psychology*, 35, 79–90.
- Hatchett, G. T. (2006). Additional validation of the attitudes toward seeking professional psychological help scale. *Psychological Reports*, 98, 279–284.
- Hoge, C. W., Castro, C. A., Messer, S. C., McGurk, D., Cotting, D. I., & Koffman, R. L. (2004). Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *New England Journal of Medicine*, 351, 13–22.
- Hosmer, D. W., & Lemeshow, S. (2000). *Applied Logistic Regression*. (2nd ed.). New York: Wiley-Interscience.
- King, D. W., King, L. A., & Vogt, D. S. (2003). *Manual for the Deployment Risk and Resilience Inventory (DRRI): A collection of measures for studying deployment-related experiences of military veterans*. Boston, MA: National Center for PTSD.
- Litz, B., & Maguen, S. (2006). Predictors of barriers to mental health treatment for Kosovo and Bosnia peacekeepers: A preliminary report. *Military Medicine*, 171, 454–458.
- Maguen, S., Schumm, W. R., Norris, R. L., Taft, C. T., King, L., King, D. W., et al. (2007). Predictors of mental health service utilization among Vietnam Veterans. *Psychological Services*, 4, 168–180.
- Marin, A. (2002). Systemic treatment of CF members with PTSD. Ombudsman report. Retrieved December 10, 2008, from <http://www.ombudsman.forces.gc.ca>
- Marshall, R. P., Jorm, A. F., Grayson, D., Dobson, M., & O'Toole, B. I. (1997). Help-seeking in Vietnam veterans: Posttraumatic stress disorder and other predictors. *Australian and New Zealand Journal of Public Health*, 21, 211–213.
- Milliken, C. S., Auchterlonie, J. L., & Hoge, C. W. (2007). Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq war. *Journal of the American Medical Association*, 298, 2141–2148.
- Office of the Undersecretary of Defense (Personnel and Readiness). (2006). *Population representation in the military services: Fiscal Year 2005*. Washington, DC: Author.
- Sayer, N. A., Clothier, B., Spoon, M., & Nelson, D. B. (2007). Use of mental health treatment among veterans filing claims for posttraumatic stress disorder. *Journal of Traumatic Stress*, 20, 15–25.
- Seal, K. H., Bertenthal, D., Miner, C. R., Sen, S., & Marmar, C. (2007). Bringing the war back home: Mental health disorders among 103,788 US veterans returning from Iraq and Afghanistan seen at Department of Veterans Affairs facilities. *Archives of Internal Medicine*, 167, 476–482.
- Veterans Health Administration Office of Public Health and Environmental Hazards. (2008). *Analysis of VA health care utilization among US Global War on Terrorism (GWOT) veterans*. Washington, DC: Author.
- Vogt, D. S., Proctor, S. P., King, D. W., King, L. A., & Vasterling, J. J. (2008). Validation of scales from the Deployment Risk and Resilience Inventory in a sample of Operation Iraqi Freedom veterans. *Assessment*, 15, 27–38.
- Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993, October). The PTSD Checklist: Reliability, validity & diagnostic utility. Paper presented at the Annual Meeting of the International Society for Traumatic Stress Studies, San Antonio, TX.

Prospective Risk and Resilience Factors Associated with PTSD Symptoms in National Guard Soldiers Deployed to Iraq

Melissa A. Polusny

Minneapolis Veterans Affairs Medical Center
University of Minnesota Medical School



Congressionally Directed Medical Research Program W81XWH-07-2-0033
Minneapolis VA Medical Center
Minnesota Veterans Research Institute
Minnesota Medical Foundation
University of Minnesota Press

Readiness and Resilience in National Guard Soldiers (RINGS) Research Team

Co-Principal Investigator: Christopher R. Erbes, PhD

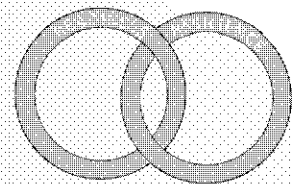
Co-Investigators: Paul A. Arbisi, PhD, ABPP

Paul Thuras, PhD

Maureen Murdoch, MD, MPH

Lead Statistician: Darin Erickson, PhD

Military Collaborators: COL Michael B. Rath, CPT Cora Courage,
Minnesota Army National Guard



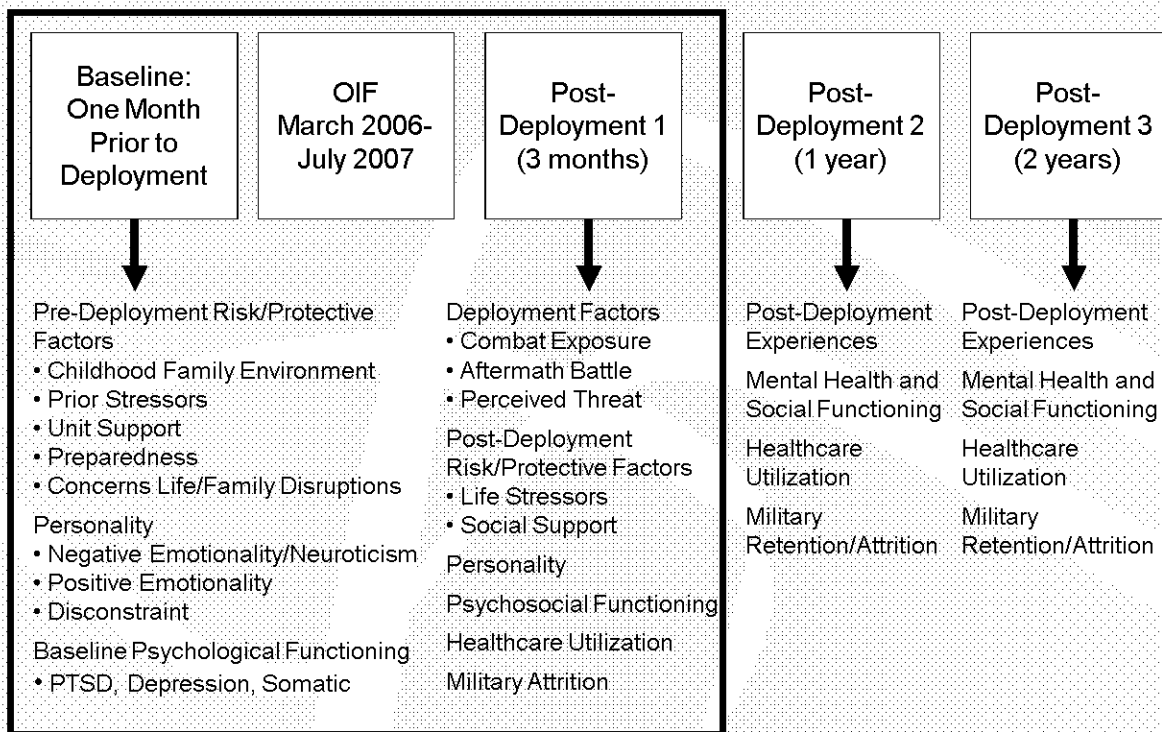
Background

- Increase in National Guard troop deployments
 - NG/R troops at heightened risk for PTSD
- Identification of risk/protective factors associated with PTSD is critical
 - Most studies have used retrospective, cross-sectional designs

Goals of the RINGS Cohort Study

- To prospectively identify risk and protective factors for combat-related PTSD in a cohort of National Guard troops deployed to OIF

RINGS Cohort Study Design



Methods

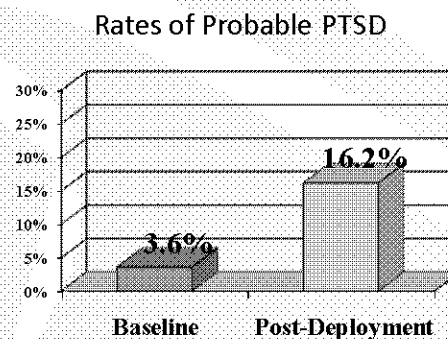
Participants: 522 (462 male, 60 female) soldiers; representative of the BCT

Pre-deployment: Surveyed in small groups under standardized conditions

Post-Deployment: Standard mail survey methodology (81% response rate)

• *No differences on gender, race, baseline PTSD symptoms, or predeployment risk/protective factors*

Baseline Characteristics	n = 424
Gender (% Male)	87.7%
Age (mean, SD)	29.9 (8.8)
Race (% Caucasian)	94.5%
Marital Status (% Married)	48.8%
Rank (% Enlisted)	88.9%



Results

- Dependent Variable: Time 2 PCL-M
- Independent variables entered in steps
 - Step 1: Pre-deployment Factors: $\Delta R^2 = .26^{***}$
 - Step 2: Deployment Factors: $\Delta R^2 = .12^{***}$
 - Step 3: Post-deployment Factors: $\Delta R^2 = .11^{***}$
 - Final Model: Adjusted $R^2 = .46^{***}$

Predictors of T2 PCL

Predictor Variable	β (block of entry)	β (final model)
Gender	.12 ^{***}	.14 ^{***}
Baseline PTSD symptoms	.18 ^{***}	.14 ^{***}
Personality (NEM)	.15 ^{***}	.10 ^{***}
Prior Life Stressors	.22 ^{***}	.07
Military Preparedness	-.13 ^{***}	-.02
Concerns Life/Family Disruptions	.11 ^{***}	.05
Combat Exposure	.20 ^{***}	.19 ^{***}
Exposure to Aftermath of Battle	.11 ^{***}	.11 ^{***}
Perceived Life Threat	.16 ^{***}	.10 ^{***}
Post Deployment Social Support	-.36 ^{***}	-.36 ^{***}

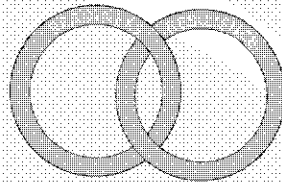
Summary and Implications

- Rates of PTSD increased over 5-fold from baseline to post deployment
- Deployment stressors were independently associated with PTSD symptoms
- Factors present both prior to deployment and following deployment were associated with post deployment PTSD symptoms
- Strategies aimed at addressing family/life concerns and bolstering preparedness before deployment might enhance soldier resilience following deployment

Thank you

Contact Information:

Email: melissa.polusny@va.gov



Prospective Risk and Resilience Factors Associated with PTSD Symptoms in National Guard Soldiers Deployed to Iraq

Melissa A. Polusny^{1,2,3}, Christopher R. Erbes^{1,2}, Paul Arbis^{1,2}, Paul Thuras^{1,2}, Madhavi K. Reddy^{1,2}, Maureen Murdoch^{1,2,3}, Darin Erickson², Robyn Campbell^{1,3}

¹Minneapolis VA Medical Center, ²University of Minnesota Medical School, ³Center for Chronic Disease Outcomes Research (CCDOR)

BACKGROUND

Over 1.6 million U.S. troops have served in Iraq (Operation Iraqi Freedom; OIF) and Afghanistan (Operation Enduring Freedom; OEF). While most returning military personnel will be resilient, combat exposure and other deployment stressors are associated with considerable risks of posttraumatic stress disorder (PTSD). Identification of factors that promote resilience is critical, yet existing literature is limited by use of retrospective, cross-sectional designs. Moreover, military operations have increasingly relied on National Guard and Reserve troop deployments who may be at heightened risk for PTSD compared to active duty troops. This presentation will examine pre-deployment, deployment related and post-deployment factors associated with post-deployment PTSD symptomatology.

STUDY OVERVIEW

The Readiness and Resilience in National Guard Soldiers (RINGS) Cohort Study is a prospective, 4-wave, longitudinal investigation of individual, environmental and contextual factors influencing risk and resiliency in National Guard soldiers deployed to OIF. Hierarchical linear regression analyses was conducted to examine d pre-deployment, combat/deployment related, and post-deployment variables associated with Time 2 PTSD symptoms.

Objective

To prospectively identify risk and protective factors for combat-related PTSD in a cohort of National Guard troops deployed to Operation Iraqi Freedom (OIF).

Participants

- 522 (462 male; 60 female) Army National Guard soldiers from a Brigade Combat Team
- The sample represented 20% of the Brigade Combat Team

Procedures

Time 1 Predeployment Data Collection:

- One month prior to soldiers' deployment to Iraq (March 2006), predeployment, baseline measures of PTSD symptoms and risk/protective factors (see Table 1) were collected
- Soldiers had completed 5 months of intensive mobilization training at Camp Shelby, Mississippi and were poised for a one year deployment which was later extended by 4 months
- Participants completed questionnaires in group classrooms under standardized conditions

Time 2 Postdeployment Data Collection:

- Using standard mail survey methodology, postdeployment data were collected about 3 months after soldiers' return from deployment
- Survey items were counterbalanced to control for the potential influence of order effects
- Less than 1% of the original cohort could not be contacted due to incomplete or missing address information
- Of the remainder, 424 (81%) returned post-deployment questionnaires
- As shown in Table 2, there was no significant difference between responders and non-responders on gender, ethnicity, baseline PTSD symptoms, or predeployment risk/protective factors. There were minimal differences between responders and non-responders on rank (enlisted vs. officer/warrant officer), marital status, and age.

Measures

- Subscales from the Deployment Risk and Resilience Inventory (DRRI) – see Table 1
- Abbreviated MMPI-2 RF PSY-5 Scales (Negative Emotionality, Introversion, Disconstraint)
- PTSD Checklist (PCL)

Table 1

Deployment Risk and Resilience Inventory—Subscales used at Pre-deployment and Post-deployment

DRRI Measure	Description of Construct	Alpha
Predeployment Factors		
Childhood Family Environment	Quality of early life one's family of origin in terms of cohesion, accord, and closeness among family members.	.91
Prior Stressors	Exposure to traumatic events prior to deployment (e.g., natural disaster, childhood abuse, physical/sexual assault, previous combat exposure).	.68
Unit Social Support	Amount of assistance and encouragement in the war zone from the military in general, unit leaders, and other unit members.	.91
Concerns about Life and Family Disruptions	Worries that deployment might negatively affect other important life domains such as career-related concerns and family-related concerns.	.81
Preparedness	Extent to which the individual perceives that s/he is prepared for deployment including having the supplies and equipment needed, proper training, and what to expect in terms of their role in the deployment.	.81
Deployment Related Factors		
Combat Experiences	Exposure to warfare experiences such as firing a weapon, being fired upon, witnessing injury or death, or going on missions or patrols. This factor refers to objective events and circumstances.	.86
Aftermath of Battle	Exposure to the consequences of combat, including observing or handling the remains of civilians, enemy soldiers, U.S. and allied personnel, or animals, dealing with POWs, observing devastated communities or homeless refugees.	.87
Perceived Threat	Fear for one's safety and well-being in the war zone, especially as a response to combat. This factor refers to emotional or cognitive appraisals of situations that may not be representative of the actual situation.	.82
Unit Support	Amount of assistance and encouragement in the war zone from the military in general, unit leaders, and other unit members.	.84
Concerns about Life and Family Disruptions	Worries that deployment might negatively affect other important life domains such as career-related concerns and family-related concerns.	.82
Preparedness	Extent to which the individual perceives that s/he was prepared for deployment including having the supplies and equipment needed, proper training, and what to expect in terms of their role in the deployment.	.84
Postdeployment Factors		
Postdeployment Stressors	Exposure to stressful life events after deployment, including general events unrelated to deployment (vehicular accidents, death/illness of a relative) and events related to reintegration (job interruption, difficulties reestablishing family/community roles, legal and financial difficulties), or divorce.	.56
Postdeployment Social Support	Extent to which family, friends, coworkers, employers, and community provide emotional sustenance (understanding, companionship, sense of belonging, and positive regard) and instrumental assistance (tangible aid and material assistance or resources).	.84

RESULTS

Table 2

Predeployment Characteristics of Time 2 Responders and Non-Responders

	Respondents (n = 424) M(SD)	Non-respondents (n = 98) M(SD)
Demographics		
Gender (% men)	87.7	91.8
Age	29.86(8.79)	25.63(6.85)***
Race (% white)	94.5	88.7
Marital Status (% married)	48.8	30.6**
Enlistment Status (% enlisted)	88.9	95.9*
Years of Education	14.36(2.03)	13.46(1.72)
DRRI Subscales		
Childhood Family Environment	53.44(10.42)	53.28(9.27)
Prior Life Stressors	5.64(3.27)	5.46(3.13)
Military Preparedness	34.30(7.44)	35.11(7.10)
Deployment Social Support	40.46(10.01)	41.33(9.39)
Concerns Life/Family Disruptions	28.96(7.38)	28.01(7.85)
Baseline PCL Total	26.04(9.75)	26.91(11.10)
MMPI-2 RF PSY-5 Scales		
Negative Emotionality (NEM)	5.44(4.13)	5.35(4.10)
Introversion (PEM)	6.07(2.90)	5.40(3.13)
Disconstraint (DISC)	8.33(2.61)	8.98(2.64)

*p < .05, **p < .01, ***p < .001. DRRI=Deployment Risk and Resilience Inventory

Table 3

Correlations between Risk and Resilience Factors and PTSD Symptoms at Time 1 and Time 2

	Time 1 PCL	Time 2 PCL
Predeployment Factors		
Gender	.07	.15***
Age	-.14*	-.12*
Rank	.07	.09
MMPI-2 RF PSY-5 Scales		
Negative Emotionality/ Neuroticism (NEM)	.61**	.35**
Introversion (PEM)	.25**	.06
Disconstraint (DISC)	.08	.16*
Prior Life Stressors	.20*	.30*
Childhood and Family Environment	-.29*	-.17*
Concerns about Life/Family Disruptions	.27*	.24*
Unit Social Support	-.28*	-.14*
Military Preparedness	-.23*	-.23*
Deployment Related Factors		
Combat Experiences	.19*	.38*
Exposure to Aftermath of Battle	.14*	.37*
Perceived Threat	.15*	.36*
Postdeployment Factors		
Postdeployment Life Stressors	.22*	.32*
Postdeployment Social Support	.22*	.51**

*p < .05, **p < .01, ***p < .001. PCL = PTSD Checklist

Table 4

Summary of Multiple Regression Analyses for Predeployment, Deployment, and Postdeployment Variables Predicting Postdeployment PTSD Symptoms (N = 424)

Risk/Protective Factor	β at each step	Final β
Step 1: Predeployment Factors		
Gender	-.12*	.14***
Age	-.07	-.02
Rank (enlisted)	.01	.03
Baseline PTSD symptoms	.18**	.14**
MMPI-2 PSY-5 Scales		
Negative Emotionality/Neuroticism (NEM)	.15*	.10*
Introversion/Low Positive Emotionality (PEM)	.01	-.01
Disconstraint (DISC)	.06	.01
Childhood Family Environment	.04	.05
Prior Life Stressors	.22**	.07
Military Preparedness	-.13*	-.02
Concerns Life/Family Disruptions	.11*	.05
Unit Support	.10	.07
Step 2: Deployment Related Factors		
Combat Experiences	.20**	.19***
Exposure to Aftermath of Battle	.11*	.11*
Perceived Life Threat	.16**	.10*
Step 3: Postdeployment Factors		
Postdeployment Life Stressors	.05	.05
Postdeployment Social Support	-.36***	-.36***

*p < .05, **p < .01, ***p < .001.

SUMMARY

- At Time 2, 16.2% of participants screened positive for probable PTSD.
- Although there were no gender differences in baseline levels of PTSD, women reported significantly higher rates of probable PTSD (22%) than men (14%) at Time 2 ($p < .01$).
- After controlling for gender, age, rank, baseline PTSD symptoms and personality, soldiers' reports of prior life stressor exposure, perceptions of preparedness for deployment, and worries about the impact of deployment on life and family emerged as significant prospective predictors of postdeployment PTSD symptomatology [$F(12, 403)=11.39, p < .0001, R^2=.26$].
- Deployment related factors significantly added to the amount of variance accounted for in Time 2 PCL [$F(15, 403)=15.48, p < .0001, R^2$ change=.12].
- Soldiers' reported combat exposure, witnessing the aftermath of battle, and greater perceived life threat during deployment all independently predicted post-deployment PTSD symptoms.
- However, when deployment related factors were considered, soldiers' pre-deployment perceptions of preparedness and worries about the impact of deployment on life and family were no longer significant predictors of Time 2 PCL.
- Lack of post-deployment social support, but not post-deployment life stressors, emerged as a significant unique predictor of post-deployment PTSD symptomatology [$F(17, 403)=21.09, p < .0001, R^2$ change=.11].
- When we examined the independent contribution of the entire set of variables to Time 2 PCL, female gender, baseline PTSD symptoms, the personality dimension of negative emotionality/neuroticism, combat exposure, witnessing the aftermath of battle, greater perceived life threat, and lack of postdeployment social support were significant unique predictors of post-deployment PTSD symptomatology, accounting for 48.1% of the variance in the final full model.

CONCLUSIONS

While combat exposure is an important predictor of PTSD, risk and protective factors present both prior to and following deployment are associated with post-deployment PTSD symptomatology.



Contact Information: Melissa A. Polusny, Ph.D., Minneapolis VA Medical Center, Post-Traumatic Stress Recovery Program (116A-9), One Veterans Drive, Minneapolis, MN 55417. Phone: (612) 725-2125; Email: Melissa.Polusny@va.gov



Funded by: Minnesota Medical Foundation, Grant # 3662-9227-06 and Department of Defense, W81XWH-07-2-0033

Impact of Prior Operation Enduring Freedom/Operation Iraqi Freedom Combat Duty on Mental Health in a Predeployment Cohort of National Guard Soldiers

Melissa A. Polusny, PhD*†‡; Christopher R. Erbes, PhD*‡; Paul A. Arbisi, PhD*†§; Paul Thuras, PhD*‡; Shannon M. Kehle, PhD*†‡; COL Michael Rath, MC MNARNG¶; MAJ Cora Courage, MSC USAR||; Madhavi K. Reddy, MA*‡; Courtney Duffy, BA*‡

ABSTRACT Objectives: The goal was to examine the impact of prior Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) combat deployment on reported psychiatric and somatic symptoms among National Guard/Reserve (NGR) soldiers 1 month before deployment to Iraq. Method: 522 NGR soldiers completed a survey assessing predeployment risk and resilience factors as well as current levels of PTSD, depressive, and somatic symptoms. Results: Overall, soldiers reported few psychiatric symptoms present before deployment to Iraq. However, compared to soldiers preparing for their first deployment to Iraq, soldiers previously deployed to OEF/OIF reported more PTSD, depressive, and somatic symptoms. Previously OEF/OIF deployed soldiers reported lower perceptions of unit social support, but reported no differences in perceptions of preparedness or concerns about family disruptions. Implications for interventions and training with military personnel before deployment as well as future longitudinal research directions are discussed.

INTRODUCTION

With over 1.6 million U.S. troops serving combat deployments in Afghanistan (Operation Enduring Freedom [OEF]) and Iraq (Operation Iraqi Freedom [OIF]) since 2001, National Guard and Reserve (NGR) component soldiers have played an increasingly vital role in sustaining these military operations. Up until recently, NGR troops served 1 weekend a month and 2 weeks a year and were activated primarily to assist civilian authorities with local emergencies and natural disasters. For example, during the Vietnam War, approximately 28,000 Army and Air Guardsmen were called up for a year of active duty service, although only about 8,700 actually deployed to Vietnam. In contrast, as of November 2006, NGR component troops made up nearly half (46%) of the combat brigades in Iraq. This trend is likely to continue given the military's sustained high operational tempo. NGR soldiers will likely be called upon to serve not only for local emergencies and natural disasters, but also remain critical to supplementing active forces in OEF and OIF, making repeated extended combat deployments common.¹ Although a growing body of evidence has documented the

cumulative impact of trauma exposure, little research has investigated the impact of repeated combat deployments on OEF/OIF soldiers' mental health. In addition, few studies have examined the relationship between prior combat exposure and other factors that may serve to mitigate or potentiate the impact of prior combat deployment on the mental health of NGR soldiers.^{2,3}

Combat exposure is associated with considerable risks of postdeployment mental health concerns, including posttraumatic stress disorder (PTSD),^{4,5} depression,⁶ substance abuse,⁷ and physical health problems.⁸ For example, nearly 19% of Vietnam veterans reported lifetime PTSD in the National Vietnam Veterans Readjustment Study.⁵ Similarly, as many as 17–19% of active duty component soldiers screened positive for PTSD, depression, or anxiety upon returning from OEF/OIF.^{9,10}

Some reports indicate that NGR troops are at increased risk for the development of emotional or psychological complications compared to active duty troops.¹¹ This risk for the development of psychiatric disorders appears to increase at a greater rate for NGR soldiers in the months and years following deployment.^{12,13} For example, Milliken and colleagues found that rates of PTSD and depression more than doubled among NGR component soldiers between initial Post-Deployment Health Assessment and the Post-Deployment Health Reassessment conducted about 6 months later.¹² The increase in emotional problems over time for NGR soldiers exceeded the rates found in regular active duty component service members. In a three-wave longitudinal study of 2,949 Gulf War I veterans, Wolfe and colleagues found that NGR soldiers were at increased risk for developing PTSD over time.¹³ Initially at time 1, when soldiers were assessed about 4–5 days following their return from deployment to Gulf War I, NGR status was not associated with PTSD symptoms. However, NGR status independently contributed to the development of PTSD 2 years later in this same cohort.

*Minneapolis Veterans Affairs Medical Center (VAMC), One Veterans Drive (116A), Minneapolis, MN 55417.

†Center for Chronic Disease Outcomes Research, Minneapolis VAMC, One Veterans Drive (116A), Minneapolis, MN 55417.

‡University of Minnesota Medical School, Department of Psychiatry, Minneapolis, MN 55414.

§University of Minnesota, Department of Psychology, Minneapolis, MN 55414.

¶State Medical Command, Minnesota Army National Guard, 600 Cedar Street, TACC, St. Paul, MN 55101.

||328 Combat Support Hospital, Fort Douglas, UT 84113.

Portions of this study were presented at that annual meeting of the International Society for Traumatic Stress Studies.

This manuscript was received for review in March 2008. The revised manuscript was accepted for publication in December 2008.

Following deployment, NGR component soldiers may face unique reintegration challenges as they transition from warfighter back to civilian roles. Compared to active duty soldiers, NGR soldiers tend to be older and may be more likely to have left family and civilian work responsibilities outside the military.¹⁴ As a result, NGR troops may face significantly greater familial and occupational strain both during and following deployment, and these challenges may contribute to NGR soldiers' elevated risk for mental health difficulties postdeployment. For instance, postdeployment stressful life events (e.g., occupational or legal difficulties, marital disruptions) have been shown to be associated with higher rates of PTSD and depression.¹⁵⁻¹⁷ Further, because they are not embedded with their military units following a combat deployment, NGR personnel may also have lower levels of support from social and occupational peers, which may also increase risk for PTSD.¹⁷

Sustained military operations in Iraq and Afghanistan have led to increased numbers of military personnel serving multiple combat tours. Two reports have addressed the issue of multiple deployments among active duty soldiers and Marines, but reached different conclusions. The third iteration of the Mental Health Advisory Team (MHAT-III) examined 1,122 soldiers and Marines during their deployment to Iraq.¹ Service members with previous OIF deployments were found to have significantly higher levels of acute stress (posttraumatic stress symptomatology) than those on their first deployment. Active duty soldiers with previous OIF deployments were also at greater risk for developing other psychiatric complications. Specifically, they reported greater concerns about deployment length, family separation, and boring/repetitive work as well as significantly lower levels of unit morale than those on their first deployment.¹

On the other hand, Killgore and colleagues¹⁸ reported findings that seem to contradict the MHAT-III. In their sample of 2,068 active duty soldiers who were about to be deployed to Iraq, they found that the 8.3% of soldiers with previous combat deployments (in the first Gulf War, Somalia, or OIF) did not report higher rates or levels of PTSD symptoms. Prior combat service was associated with lower levels of affective symptoms and higher levels of somatic symptoms. They hypothesized that these findings indicated possible repression of distress with accompanying somatic amplification in soldiers about to be reexposed to combat situations.

The timing of data collection (during versus before deployment) may account for the discrepant findings between the two studies, although MHAT-III hypothesized that increased psychiatric symptomatology found in previously deployed soldiers was the result of preexisting symptoms of PTSD,¹ rather than the development of symptoms during the current deployment. The definition of prior deployment (only OIF versus prior combat deployment to OIF, Somalia, or the first Gulf War) may have also affected the findings. It is possible that combat conditions and psychological demands of deployments to Somalia (a peacekeeping mission) and the first Gulf War (involving 40 days of aerial assaults and 5 days of ground combat) may be

quite different from those of the sustained military operations in OEF and OIF.⁹ Clearly, more work is needed in examining the effects of multiple combat deployments in troops during and after combat tours. Additionally, we are aware of no studies on the effect of multiple combat deployments on NGR soldiers as they prepare for deployment.

The present study addresses these gaps in the literature by examining levels of mental health symptoms (posttraumatic stress, depressive, and somatic) and risk and resilience factors (unit support, perceived military preparedness, and concerns about family disruptions from the deployment) among NGR soldiers with and without prior OEF/OIF combat deployments.

METHOD

Procedures

Soldiers from a National Guard Brigade Combat Team, who were deployed to Iraq in March 2006, voluntarily completed a survey at Camp Shelby, Mississippi 1 month before deployment. Participants were recruited through unit announcements and flyers. Soldiers were provided a description and overview of the study and informed that their participation in the study was voluntary and confidential. After providing written informed consent, soldiers completed the survey in group classrooms under standardized conditions with an investigator present to answer questions. The institutional review board at the Minneapolis Veterans Affairs Medical Center and the Minnesota National Guard command approved all procedures and materials.

Participants

Participants were 522 male and female National Guard soldiers from the 1st Brigade Combat Team of the 34th Infantry Division (1/34 BCT) who had completed approximately 6 months of training at Camp Shelby, Mississippi before being deployed to Iraq. The demographic profile of the study sample was very similar to that of the 1/34 BCT as a whole. Participants were primarily male (88.5%; $n = 462$), most were Caucasian (91.8%; $n = 479$), and nearly half of the participants were married (45.5%; $n = 237$). The mean age of participants was 29.1 (SD = 8.6), with 60% ($n = 313$) of soldiers between the ages of 18 and 29. The majority of participants were enlisted personnel (90.2%, $n = 471$), with 9.8% ($n = 51$) reporting a rank of officer or warrant officer. In terms of educational attainment, 26.6% ($n = 139$) reported a high school diploma, 41.2% ($n = 215$) reported some college, and 30% ($n = 157$) reported a college or graduate degree. Twenty-nine soldiers (5.6%) reported at least one prior deployment to OIF or OEF. Sample demographics for soldiers with and without a prior deployment to OEF or OIF are presented in Table I.

Measures

Risk and Resilience Factors

Scales from the Deployment Risk and Resilience Inventory (DRRI)^{19,20} were used to assess key psychosocial resilience and risk factors for military personnel deployed to the Iraqi

TABLE I. Demographics

Variable	Predeployment Sample (n = 522)	
	Prior Deployment (n = 29)	No Prior Deployment (n = 493)
Age (years)	29.7 (7.8)	29.0 (8.7)
Marital Status (% married)	55.2%	44.8%
Ethnicity (% Caucasian)	93.1%	91.7%
Rank (% enlisted)	82.8%	90.7%

combat zone. The DRRI is ecologically valid and appropriate for use with military personnel participating in recent and current deployments and has been successfully used in self-report and mail survey formats.¹⁹ In samples of active duty and NGR component soldiers from Gulf War I, the DRRI showed predicted relationships with measures of mental health difficulty (PTSD, depression, general anxiety), physical health, and quality of life.^{20,21} We examined the following DRRI subscales: predeployment *Concerns about Life and Family Disruptions* (14 items, $\alpha = 0.80$ in the current sample), which measures individuals' concerns about the potential adverse effects deployment may have on important life domains; predeployment perceptions of *Preparedness* (10 items, $\alpha = 0.81$ in the current sample) for military deployment; and predeployment perceptions of *Unit Social Support* (12 items, $\alpha = 0.91$ in the current sample).

Posttraumatic Stress Disorder Symptoms

PTSD symptoms were assessed using the PTSD Checklist (PCL).^{22,23} This 17-item self-report scale uses a 5-point Likert scale ranging from "not at all" to "extremely" to evaluate the severity of PTSD symptoms using Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria. The PCL has demonstrated excellent internal consistency ($\alpha = 0.94$ – 0.97); in Vietnam veterans the 2–3 day test-retest reliability was 0.96.²² The PCL correlates highly with other interview and self-report measures of PTSD.²² Alpha for the PCL total score in the current sample was 0.92.

Depressive Symptoms

Depressive symptomatology was measured by the Beck Depression Inventory II (BDI-II),²⁴ a widely used 21-item self-report measure of the severity of depressive symptoms. Respondents are asked to rate on a 4-point scale (0–3) how often they have experienced each item in the past 2 weeks. Scores greater than or equal to 20 suggest probable depression. The BDI-II has good internal consistency with an α coefficient of 0.92 for outpatients and 0.93 for college students; test-retest reliability over 1 week was 0.93. The BDI-II correlates with other measures of depressive symptoms, and construct validity of the instrument has been well established. Alpha for the BDI-II total score for the current sample was 0.91.

Somatic Symptoms

Questions from the Primary Care Evaluation of Mental Disorders (PRIME-MD)^{25,26} that assess common physical

health complaints were used to assess somatic problems and health perceptions. This questionnaire includes 16 items that inquire about somatic complaints that comprise over 90% of physical complaints reported in outpatient settings²⁷ as well as 1 item that assesses general perception of one's physical health. Frequency ratings for the 16 symptom items were summed for a somatic distress score. The PRIME-MD demonstrated good internal consistency in the current sample ($\alpha = 0.83$).

RESULTS

Differences in psychiatric and somatic complaints as well as risk and resilience factors between soldiers with and without prior OEF/OIF deployment were examined using analysis of variance (ANOVA). As shown in Table II, soldiers with prior OEF/OIF exposure reported a greater number and increased severity of PTSD symptoms than soldiers not previously deployed to OEF/OIF, $F(1,514) = 7.42$, $p < 0.01$, $\eta^2 = 0.014$. Previously OEF/OIF deployed soldiers also reported more depressive symptoms than those not previously deployed, $F(1,514) = 6.11$, $p = 0.01$, $\eta^2 = 0.012$. Finally, soldiers with prior OEF/OIF deployment exposure reported greater somatic symptoms, $F(1,514) = 3.89$, $p = 0.05$, $\eta^2 = 0.008$.

We examined differences on risk and resilience factors assessed by the DRRI between those soldiers who had a prior OEF/OIF deployment and those without prior OEF/OIF combat experience (see Table III). There were no differences between soldiers with and without prior OEF/OIF combat deployment experience on perceptions of preparedness for deployment, $F(1,516) = 1.09$, $p > 0.05$, $\eta^2 = 0.002$, or concern for family disruption, $F(1,516) = 0.74$, $p > 0.05$, $\eta^2 = 0.001$. However, soldiers who had prior OEF/OIF deployments reported lower perceptions of unit social support than those soldiers preparing for their first deployment to Iraq, $F(1,516) = 5.01$, $p = 0.02$, $\eta^2 = 0.01$. Finally, we examined

TABLE II. Predeployment Symptoms by Prior Deployment Status

Measure	Prior Deployment Status	
	Prior Deployment	No Prior Deployment
PCL	31.2 (14.5)**	25.9 (9.6)
BDI-II	9.1 (9.2)*	5.8 (6.6)
PRIME-MD	3.9 (3.3)*	2.8 (2.9)

* $p < 0.05$; ** $p < 0.01$. PCL, PTSD Checklist; BDI-II, Beck Depression Inventory 2; PRIME-MD, Somatic Symptom Count from PRIME-MD.

TABLE III. Risk and Resilience Factors by Deployment Status

Scale	Prior OEF/OIF Deployment	No Prior Deployment
Unit Social Support	36.6 (12.2)	40.9 (9.7)*
Life/Family Disruption	27.6 (9.5)	28.9 (7.4)
Preparedness	33.0 (8.7)	34.5 (7.3)

* $p < 0.05$.

TABLE IV. Associations between Risk and Resilience Factors and Predeployment Symptoms

Variable	BDI-II	PRIME-MD	DRRI Preparedness	DRRI Unit Social Support	DRRI Life/Family Disruption
PCL	0.74*	0.51*	-0.23*	-28*	0.27*
BDI-II		0.57*	-0.30*	-0.42*	0.24*
PRIME-MD			-0.20*	-0.23*	0.25*
DRRI Preparedness Subscale				0.51*	-0.23*
DRRI Unit Social Support Subscale					-0.24*

* $p < 0.001$. PCL, PTSD Checklist; BDI-II, Beck Depression Inventory 2; PRIME-MD, Somatic Symptom Count from PRIME-MD; DRRI, Deployment Risk and Resilience Inventory.

relationships between risk and resilience factors as measured by the DRRI subscales (Preparedness, Concern for Family Disruption, and Unit Social Support) and symptom measures (PTSD, depressive and somatic symptoms, or physical health complaints). Correlations between current symptoms and risk and resilience factors are presented in Table IV. Symptoms of PTSD and depression as well as somatic complaints present before deployment were significantly associated with soldiers' perceptions of being less prepared for deployment, having greater concerns about the impact of deployment on life and family, as well as reporting lower perceived social support by their unit.

DISCUSSION

Overall, in the current study, the majority of National Guard soldiers reported low levels of psychiatric symptoms. These findings suggest that most National Guard soldiers were in good mental health before their current deployment to OIF. However, results of this study found elevated PTSD and depressive symptoms as well as greater somatic complaints before current OIF deployment among National Guard soldiers who had already served a prior OEF/OIF combat deployment. Soldiers previously deployed to OEF/OIF also reported lower perceptions of unit support, but showed no differences in perceptions of military preparedness or concerns about the deployment disrupting their life or family.

The findings of this study are consistent with and extend those reported by the MHAT-III in several ways. Although the MHAT-III found that active duty personnel with prior OIF deployments had elevated PTSD symptoms during a subsequent deployment, we similarly found these differences in National Guard soldiers before deployment. We also found elevated levels of depressive and somatic complaints present among previously OEF/OIF deployed National Guard soldiers as they prepared for their next deployment. Consistent with the MHAT-III findings, we found that prior OEF/OIF deployment was associated with lower perceptions of unit support. However, our study did not reveal differences between those with and without prior OEF/OIF deployment on other potential risk factors such as concerns about life and family disruption or perceptions of military preparedness for deployment.

Our results only partially replicated the findings of Killgore and colleagues¹⁹ who showed elevated rates of somatic complaints, but not PTSD or depression among those with prior

deployments. Unlike their sample of active duty soldiers preparing for deployment to Iraq, we not only found increased somatic complaints, but also increased report of depressive and PTSD symptoms in previously deployed National Guard soldiers. Thus, it may be that National Guard soldiers experience greater psychiatric disturbances as the result of multiple deployments than active duty soldiers. However, as the MHAT-III obtained similar findings for previously deployed regular active duty component service members, it is also possible that differences between the current study design and the Killgore et al. study design, such as the period of the war, military status of investigators, or other circumstances in which questionnaires were administered, could account for the inconsistent findings.

Results of this study have a number of important implications for training and intervention with military personnel before deployment. On the one hand, the findings suggest that the vast majority of National Guard soldiers in our sample, even those with prior deployments, were not reporting clinically significant levels of psychiatric or emotional problems before deployment. It may be that most military personnel are resilient in the face of deployment, or that the extensive efforts on the part of medical personnel have ensured the medical readiness of deploying troops. On the other hand, the low rates of predeployment psychiatric symptoms documented here may suggest that military screening programs and training are effective in preventing soldiers with severe distress from reaching the point of imminent deployment in most cases. Although soldiers who were previously deployed to OEF/OIF did report more symptoms across all symptom domains assessed, there were relatively small differences across the groups that may not result in noticeable performance differences for those soldiers with prior deployment experiences. On the other hand, these findings raise important questions about the cumulative effects of repeated deployments for National Guard soldiers and whether repeated combat deployments have the potential to erode the well-being and readiness of our nation's military personnel. Questions remain regarding whether soldiers with prior deployments will develop psychiatric complications at a higher rate upon their return home than soldiers who did not have a prior combat deployment. Further, it will be critical to identify what risk and protective factors may influence the mental health trajectories of soldiers who have served multiple deployments. To address these questions, we plan to

follow this cohort and examine the impact of previous combat experience as well as a range of other risk and resilience factors on soldiers' postdeployment functioning over time.

Conclusions drawn in the current report have several limitations. Participants were self-selected and although demographically quite similar to the overall brigade, participants may have differed systematically from nonparticipants in terms of psychiatric symptoms or risk and resiliency factors. The number of soldiers with previous OEF/OIF combat deployments was small in the current predeployment sample, limiting the scope and confidence of analyses. Data were collected near the end of a 6-month validation training period during which troops' readiness for deployment was evaluated by medical personnel. It is possible that military screenings may have affected the whole sample and population from which it was drawn. Data were self-reported and hence susceptible to recall errors and information biases. Although valid and reliable, the measures utilized in this predeployment survey relied on self-report instruments. Future research should incorporate "gold standard" clinical interviews that allow for careful diagnosis of PTSD, depression, substance abuse, and other postdeployment mental health problems. Finally, this report details only a single time point of assessment, and so cannot rule out possible longer-term deterioration or improvement in soldiers with multiple deployments over time.

ACKNOWLEDGMENTS

The authors thank Maureen Murdoch, MD for her helpful comments and suggestions. We also thank Abby Seifert for her assistance with this project. This research was supported by a grant from the Minnesota Medical Foundation and was supported by the Minneapolis Veterans Affairs Medical Center Research Service.

REFERENCES

1. U.S. Army Surgeon General: Report from Operation Iraqi Freedom 04-06 Mental Health Advisory Team III (MHAT-III), 2006. Available at www.armymedicine.army.mil; accessed April 29, 2007.
2. Ozer EJ, Best SR, Lipsey TL, Weiss DS: Predictors of posttraumatic stress disorder and symptoms in adults: a meta-analysis. *Psychol Bull* 2003; 129: 52-73.
3. Brewin CR, Andrews B, Valentine JD: Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *J Consult Clin Psychol* 2000; 68: 748-66.
4. Kulka R, Schlenger W, Fairbank J, et al: Trauma and the Vietnam War Generation: Report of Findings from the National Vietnam Veterans Readjustment Study. New York, Bruner/Mazel, 1990.
5. Dohrenwend BP, Turner JB, Turse NA, Adams BG, Koenen KC, Marshall R: The psychological risks of Vietnam for U.S. veterans: a revisit with new data and methods. *Science* 2006; 313: 979-82.
6. Lapierre C, Schwegler AF, LaBauve BJ: Posttraumatic stress and depression symptoms in soldiers returning from combat operations in Iraq and Afghanistan. *J Trauma Stress* 2007; 20: 933-44.
7. Shipherd JC, Stafford J, Tanner LR: Predicting alcohol and drug abuse in Persian Gulf War veterans: what role do PTSD symptoms play? *Addict Behav* 2005; 30: 595-9.
8. Schnurr PP, Spiro A: III Combat exposure, posttraumatic stress disorder symptoms, and health behaviors as predictors of self-reported physical health in older veterans. *J Nerv Ment Dis* 1999; 187: 353-9.
9. Hoge CW, Castro CA, Messer SC, McGurk D, Cotting DI, Koffman RL: Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med* 2004; 351: 13-22.
10. Hoge CW, Auchterlonie JL, Milliken CS: Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. *JAMA* 2006; 295: 1023-32.
11. U.S. Army Surgeon General: Operation Iraqi Freedom (OIF-II) Mental Health Advisory Team (MHAT-II). Report, 2005.
12. Milliken CS, Auchterlonie JL, Hoge CW: Longitudinal assessment of mental health problems among active and reserve component soldiers returning from the Iraq war. *JAMA* 2007; 298: 2141-8.
13. Wolfe J, Erickson DJ, Sharkansky EJ, King DW, King LA: Course and predictors of posttraumatic stress disorder among Gulf War veterans: a prospective analysis. *J Consult Clin Psychol* 1999; 67: 520-8.
14. Office of the Undersecretary of Defense (Personnel and Readiness). Population representation in the military services: Fiscal Year 2005. 2006.
15. Gray MJ, Bolton EE, Litz BT: A longitudinal analysis of PTSD symptom course: delayed-onset PTSD in Somalia peacekeepers. *J Consult Clin Psychol* 2004; 72(5): 909-13.
16. Green BL, Grace MC, Lindy JD, Gleser GC, Leonard A: Risk factors for PTSD and other diagnoses in a general sample of Vietnam veterans. *Am J Psychiatry* 1990; 147: 729-33.
17. King LA, King DW, Fairbank JA, Keane TM, Adams GA: Resilience-recovery factors in post-traumatic stress disorder among female and male Vietnam veterans: hardiness, postwar social support, and additional stressful life events. *J Pers Soc Psychol* 1998; 74: 420-34.
18. Killgore WD, Stetz MC, Castro CA, Hoge CW: The effects of prior combat experience on the expression of somatic and affective symptoms in deploying soldiers. *J Psychosom Res* 2006; 60: 379-85.
19. King LA, King DW, Vogt DS, Knight J, Samper RE: Deployment Risk and Resilience Inventory: a collection of measures for studying deployment-related experiences of military personnel and veterans. *Mil Psychol* 2006; 18: 89-120.
20. King DW, King LA, Vogt DS: Manual for the Deployment Risk and Resilience Inventory (DRRI): a collection of measures for studying deployment-related experiences of military veterans. Boston, MA, National Center for Posttraumatic Stress Disorder, 2003.
21. Vogt DS, Pless A, Vogt DS: Deployment stressors, gender, and mental health outcomes among Gulf War I veterans. *J Trauma Stress* 2005; 18: 115-27.
22. Weathers F, Litz BT, Herman DS, Huska JA, Keane TM: The PTSD Checklist (PCL): reliability, validity and diagnostic utility. 1993. San Antonio, TX. Paper presented at the Annual Meeting of the International Society for Traumatic Stress Studies.
23. Blanchard EB, Jones-Alexander J, Buckley TC, Forneris CA: Psychometric properties of the PTSD Checklist (PCL). *Behav Res Ther* 1996; 34: 669-73.
24. Beck AT, Steer RA, Brown GK: Manual for the Beck Depression Inventory. San Antonio, TX, The Psychological Corporation, 1996.
25. Spitzer RL, Williams JB, Kroenke K, et al: Utility of a new procedure for diagnosing mental disorders in primary care. The PRIME-MD 1000 study. *JAMA* 1994; 272: 1749-56.
26. Spitzer RL, Kroenke K, Williams JB: Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary Care Evaluation of Mental Disorders. Patient Health Questionnaire. *JAMA* 1999; 282: 1737-44.
27. Kroenke K, Spitzer RL, Williams JB, et al: Physical symptoms in primary care. Predictors of psychiatric disorders and functional impairment. *Arch Fam Med* 1994; 3: 774-9.

Copyright of *Military Medicine* is the property of Association of Military Surgeons of the United States and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.

ON COUNTERBALANCING OF SYMPTOM- REPORTING IN TRAUMA SURVEYS^{1, 2}

MADHAVI K. REDDY

*Minneapolis VA Medical Center
Department of Psychiatry
University of Minnesota Medical School*

MELISSA A. POLUSNY

*Minneapolis VA Medical Center
Department of Psychiatry
University of Minnesota Medical School
Center for Chronic Disease Outcomes Research,
Minneapolis, MN*

MAUREEN MURDOCH

*Minneapolis VA Medical Center
Center for Chronic Disease Outcomes Research, Minneapolis, MN
Department of Medicine
University of Minnesota Medical School*

Summary.—Some traumatic stress research surveys are potentially subject to context effects, such as priming, because they include questions about traumatic experiences and trauma-related symptoms within the same survey. In this study, asking about traumatic experiences before or after asking about PTSD influenced symptom reporting was investigated in a sample of 424 National Guard soldiers. Results indicate ordering of symptom measures immediately before or after reports of combat experiences did not influence reports of PTSD symptoms. Implications of results are discussed.

Traumatic stress researchers conducting large-scale, survey-based studies routinely utilize self-report instruments to measure both subjects' exposure to potentially traumatic events, and their current symptomatology. Because survey questions asking about trauma exposure can be potentially distressing trauma reminders (Ferrier-Auerbach, Erbes, & Polusny, 2009), concerns have been raised that asking respondents about their trauma history may influence their answers to later questions about trauma-related symptoms. This phenomenon, known as the context effect (Tourangeau & Rasinski, 1988), can occur when subjects are primed to respond in a particular way by their reactions to previous questions (Tourangeau, Singer, & Presser, 2003). For example, context effects could

¹Address correspondence to Melissa A. Polusny, VA Medical Center (116A9), One Veterans Drive, Minneapolis, MN 55417 or e-mail (Melissa.Polusny@va.gov).

²This research was supported by a grant to Melissa A. Polusny from the Department of Defense Congressionally Directed Peer Reviewed Medical Research Program (W81X-WH-07-2-0033). The authors would like thank members of the research team who contributed to this work: Robyn Campbell, Courtney Duffy, Ashley Gulden, Kailey Roberts, and Alicia Sandberg.

cause respondents to overstate some symptoms of Posttraumatic Stress Disorder (PTSD). To avoid this, conventional wisdom calls for counterbalancing or randomly varying the order of question sets involving reports of trauma exposures and trauma-related symptoms. Yet, counterbalancing the contents of printed survey materials is time-consuming, costly, and, when hand-assembling large quantities of paper into multiple orders, prone to error. In addition, while theoretically reasonable, the need for counterbalancing has limited empirical support. The present study examines whether counterbalancing questions about trauma exposure and trauma-related symptoms in a mailed, self-report survey resulted in differential symptom-reporting among recently returned combat soldiers.

METHOD

Participants

Participants were 424 National Guard soldiers who participated in a follow-up survey as part of a larger longitudinal study (Polusny, Erbes, Arbisi, Thuras, Kehle, Rath, *et al.*, 2009). Soldiers had completed a predeployment survey 1 mo. prior to their deployment to Iraq (Operation Iraqi Freedom) during mobilization training. Soldiers agreed to be contacted to participate in the follow-up survey upon their return from Iraq. Three mo. following soldiers' return from Iraq, standard mail survey methodology was used to collect follow-up data. The response rate for the follow-up survey was 81%. The study was approved by the institutional review boards of the University of Minnesota Medical School, Minneapolis Veterans Affairs Medical Center, and the U.S. Department of Defense.

Measures

The follow-up survey assessed soldiers' combat exposure and other deployment-related stressors, postdeployment reintegration experiences (e.g. social support, social functioning, and health care utilization), attitudes and beliefs, and trauma-related symptomatology (e.g., symptoms of Posttraumatic Stress Disorder). For the present study, the effect of responding to questions about exposure to traumatic combat experiences (priming stimulus) on subjects' reports of PTSD symptoms was examined. Priming stimulus items assessing traumatic combat experiences were drawn from the Combat Experiences and Aftermath of Battle subscales of the Deployment Risk and Resiliency Inventory (King, King, & Vogt, 2003; King, King, Vogt, Knight, & Samper, 2006; Vogt, Proctor, King, King, & Vasterling, 2008). The Combat Experiences subscale asks participants to rate if they experienced each of 16 objective combat experiences (e.g., I went on combat missions and patrols; I fired my weapon at the enemy). The Aftermath of Battle subscale asks participants to rate if they experienced each of 16 war zone experiences (e.g., "I was involved with removing dead bodies

after battle," "I observed homes or villages that had been destroyed"). The PTSD Checklist is a 17-item self-report measure of PTSD symptom severity (Weathers, Litz, Herman, Huska, & Keane, 1993). Participants rate on a 5-point Likert-type scale (1: Not at all and 5: Extremely) how much each of the 17 symptoms had bothered them in the past month. Endorsement of PTSD symptoms is evaluated by summing the individual item ratings to create a total score. The PTSD Checklist exhibits good internal consistency and sensitivity and specificity (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996). For the present sample, the coefficient alpha was .94. Score changes of 10 on the PTSD checklist are considered clinically meaningful (Monson, Gradus, Young-Xu, Schnurr, Price, & Schumm, 2008).

Procedure

Using a Latin squares design, the 20-page survey was divided into six blocks which were counterbalanced to create 12 survey orders (see Table 1). Block A assessed social functioning, Block B assessed combat exposure (priming stimulus items), Block C assessed coping skills, Block D assessed current well-being and beliefs, Block E assessed trauma-related symptoms (PTSD Checklist items), and Block F assessed beliefs about the military and health care utilization. Each participant was randomly assigned to one of the 12 orders. Participants who received one of the five survey orders in which the priming stimulus questions (combat and aftermath of

TABLE 1
THE 12 SURVEY ORDERS USED IN THE STUDY

	Order											
	1	2	3	4	5	6	7	8	9	10	11	12
Blocks	F	A	E	B	C	D	F	C	A	D	B	E
	C	D	F	A	E	B	A	D	E	F	C	B
	A	E	B	C	D	F	E	F	B	A	D	C
	D	F	A	E	B	C	B	A	C	E	F	D
	B	C	D	F	A	E	C	E	D	B	A	F

Note.—A=Block A: Social Functioning; B=Block B: Combat Experiences and Aftermath of Battle subscales of the Deployment Risk and Resiliency Inventory; C=Block C: Coping Skills; D=Block D: Current Well-being; E=Block E: PTSD Checklist; F=Block F: Health Care Utilization.

battle items comprising Block B) were presented *before* the PTSD symptom questions (PTSD Checklist items comprising Block E) were grouped and are referred to as the Combat Exposure First group. The remaining participants who received the PTSD symptom questions *before* the priming stimulus questions were grouped and are referred to as the Checklist First group. The main analysis compared PTSD symptom reporting of all participants in the Combat Exposure First group to that of the Checklist First group. A secondary analysis was limited to just those randomized to

receive the priming stimulus items (Block B) *immediately before or after* the PTSD symptoms items (Block E; $n=209$). It was hypothesized that context effects might be larger when the PTSD Checklist questions immediately followed the combat experiences items, compared to when the two blocks were separated by other assessment questions not directly referencing combat experiences. We used independent samples t tests to compare the means of the PTSD Checklist of the two groups.

RESULTS

Results showed no ordering effects on PTSD symptom reports for either analysis. In the main analysis, there was no difference in PTSD symptoms ($t_{1,421}=.336$, $p=.74$; $d=-0.03$) between the Combat Exposure First group ($M=35.97$, $SD=14.14$) and the Checklist First group ($M=35.49$, $SD=13.88$). Likewise, in the secondary analysis, there was no difference in PTSD symptoms ($t_{1,208}=.837$, $p=.40$; $d=-0.15$) between the Combat Exposure First group ($M=37.76$, $SD=15.02$) and the Checklist First group ($M=35.64$, $SD=13.91$). Given null findings, a power analysis was conducted which revealed that a sample size of at least 102 participants was needed to detect a statistically significant difference at the .05 significance level, with a moderate effect size, and 80% power. With sample sizes of 422 and 209 for the conducted t tests, adequate power was present to detect a statistically significant difference in the group means of the PTSD Checklist, if present.

DISCUSSION

Findings indicate that ordering symptomatology measures immediately before or after assessment of trauma exposure did not influence reports of PTSD symptoms among a sample of soldiers returning from combat. These results are reassuring to investigators concerned about the potential for context effects on symptom reporting based on the ordering of measures in survey packets. More importantly, it raises the question of whether the benefits to be gained by counterbalancing surveys containing multiple measures and pages outweigh the costs. Preparing surveys in which items and measures are counterbalanced is labor-intensive, expensive, and cumbersome. In this sample of military personnel, ordering survey items did not appear to influence symptom responding. Although of theoretical concern, there is little evidence to suggest that priming effects significantly alters symptom reporting. More research on this important question may be warranted.

REFERENCES

- BLANCHARD, E. B., JONES-ALEXANDER, J., BUCKLEY, T. C., & FORNERIS, C. A. (1996) Psychometric properties of the PTSD Checklist (PCL). *Behaviour Research and Therapy*, 34, 669-673.

- FERRIER-AUERBACH, A. G., ERBES, C. R., & POLUSNY, M. A. (2009) Does trauma survey research cause more distress than other types of survey research? *Journal of Traumatic Stress*, 22, 320-323.
- KING, D. W., KING, L. A., & VOGT, D. S. (2003) *Manual for the Deployment Risk and Resilience Inventory (DRRI): a collection of measures for studying deployment-related experiences of military veterans*. Boston, MA: National Center for Posttraumatic Stress Disorder.
- KING, L. A., KING, D. W., VOGT, D. S., KNIGHT, J., & SAMPER, R. E. (2006) Deployment Risk and Resilience Inventory: a collection of measures for studying deployment-related experiences of military personnel and veterans. *Military Psychology*, 18, 89-120.
- MONSON, C. M., GRADUS, J. L., YOUNG-XU, Y., SCHNURR, P. P., PRICE, J. L., & SCHUMM, J. A. (2008) Change in posttraumatic stress disorder symptoms: do clinicians and patients agree? *Psychological Assessment*, 20, 131-138.
- POLUSNY, M. A., ERBES, C. R., ARBISI, P. A., THURAS, P., KEHLE, S. M., RATH, M., COURAGE, C., REDDY, M. K., & DUFFY, C. (2009) Impact of prior Operation Enduring Freedom/Operation Iraqi Freedom combat duty on mental health in a predeployment cohort of National Guard soldiers. *Military Medicine*, 174, 353-357.
- TOURANGEAU, R., & RASINSKI, K. A. (1988) Cognitive processes underlying context effects in attitude measurement. *Psychological Bulletin*, 103, 299-314.
- TOURANGEAU, R., SINGER, E., & PRESSER, S. (2003) Context effects in attitude surveys: Effects on remote items and impact on predictive validity. *Sociological Methods & Research*, 31, 486-513.
- VOGT, D. S., PROCTOR, S. P., KING, D. W., KING, L. A., & VASTERLING, J. J. (2008) Validation of scales from the Deployment Risk and Resilience Inventory in a sample of Operation Iraqi Freedom veterans. *Assessment*, 15, 391-403.
- WEATHERS, F., LITZ, B., HERMAN, D., HUSKA, J., & KEANE, T. (1993) The PTSD Checklist (PCL): Reliability, Validity, and Diagnostic Utility. Paper presented at the Annual Convention of the International Society for Traumatic Stress Studies, San Antonio, TX, October.

Accepted December 8, 2009.